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Design and Prototype
of the ATCOM
Shipping and Storage Containers
CNU-582/E, CNU-583/E, CNU-584/E and CNU-585/E

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AFPTEF PROJECT NO.: 95-P-108

TITLE: Design and Prototype of the ATCOM Shipping and Storage Containers

ABSTRACT

The US Army Aviation and Troop Command (ATCOM) St. Louis MO AMSAT-I-SDP program office requested engineering assistance designing a small number of reusable, sealed, aluminum containers that would replace their existing line of many specialized wooden crates.

AFPTEF recommended reducing the more than 20 different containers to 4. Three of the new container designs (designated #2, #5 and #6) utilize an existing proven AFPTEF design. These three container sizes are 1675 (66") L x 510 (20") W x 457.2 (18") H, 1297 (51") x 1220 (48") x 533.2 (21"), and 1345 (53") x 1270 (50") x 1132.1 (45"). Container #3 is a totally new single walled design for which two new extrusions were designed and procured. The dimensions of this container are 2,388 L x 381 W x 394 H (94" x 15" x 15.5"). Item weights will range from 0.9 kg (2 lb.) to 70 kg (154 lb.). All containers will use polyurethane foam for the cushion system.

These stackable containers utilize standard cam-over center latches, pressure/vacuum relief valves, air filling valves, desiccant ports, and tie down rings. They are unpainted and will be manufactured exclusively from aluminum extrusions and sheet material. The life cycles of these containers are 20 years.

Prototype containers of the four designs have been fabricated and have successfully passed all qualification tests.

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INTRODUCTION:

BACKGROUND:

The Aviation and Troop Command (ATCOM) St. Louis MO AMSAT-I-SDP program office requested engineering assistance designing a small number of reusable, sealed, aluminum containers that would replace their existing line of many specialized wooden crates.

ATCOM's major goals were not only to have better, more durable containers for their items, but also to reduce the number of different containers from more than 20 down to only 4, thus greatly simplifying their warehousing needs. These four container designs, CNU-582/E, -583/E, -584/E and -585/E (see Figure 1) are designated #2, #5, #6 and #3 respectively for the purposes of this report. Three of the new container designs, #2, #5 and #6 (see Figures 2, 3 and 4) utilize an existing AFPTEF design that has already been proven to be structurally sound and sealed. Container #3 (see Figure 5) is an entirely new single walled design for which two new extrusions were designed and procured by AFPTEF. Item weights will range from 0.9 kg (2 lb.) to 70 kg (154 lb.). All containers will use 3" thick polyurethane foam for the cushion system.

These stackable containers utilize standard cam-over center latches, pressure/vacuum relief valves, air filling valves, desiccant ports, and tie down rings. They are unpainted and will be manufactured exclusively from aluminum extrusions and sheet. The life cycles of these containers are 20 years. Many of the prototype components will be fabricated using a computer numerically controlled (CNC) 3-axis milling machine with machine code generated on Parametric Technology's Pro/Engineering software.

REQUIREMENTS:

AFPTEF in conjunction with AMSAT-I-SDP developed a Statement of Work (SOW) for the design of the containers. This was a tailoring of SAE ARP1967. See Appendix 5 for Statement of Work.

DEVELOPMENT:

DESIGN OF THE CONTAINER:

These are welded aluminum, controlled breathing, reusable containers. The bases of containers 2, 5 and 6 are one piece skid/double walled extrusions with integral forklift openings, humidity indicator, pressure relief valve, air filling valve and desiccant port for easy replacement of desiccant (the desiccant controls dehumidification). The base of container 3 is single walled with a small H-beam extrusion at the top and bottom edges. A silicone rubber gasket and quick release latches create a seal at the base/lid interface. The lid of containers 2, 5 and 6 is a single sheet of aluminum fit into channels in the corner post and lid extrusions. The lid of container 3 is also a single sheet but with a small J-channel extrusion at the edges. Stacking pads on the lids provide for stacking of like containers up to 16 feet high. The containers are unpainted which reduces the original cost, environmental hazardous waste, and the life-cycle cost of the containers.

The interiors of all the containers are three inches of polyurethane foam cushion on all surfaces (convoluted foam on the sides and flat foam on the top and bottom, see Figure 10). Because of their many different configurations, the items are not tied down inside the containers, but instead are wrapped and blocked with suitable materials using the same methods and procedures as previously used with the old wooden crates.

TESTING:

CONTAINER DESCRIPTIONS:

These containers are sealed, reusable, aluminum containers engineered for the physical and environmental protection of various repairable aircraft spare parts during worldwide transportation and storage. Each container consists of a cover and base equipped with the special features listed below. The container sizes are (container #2) 1675 (66") L x 510 (20") W x 457.2 (18") H, (container #3) 2,388 (94") x 381 (15") x 394 (15.5"), (container #5) 1297 (51") x 1220 (48") x 533.2 (21"), and (container #6) 1345 (53") x 1270 (50") x 1132.1 (45").

CONTAINER FEATURES					
	AT	ATCOM CONTAINER #			
FEATURE	2	3	5	6	
PRESSURE RELIEF VALVE	YES	YES	YES	YES	
HUMIDITY INDICATOR	YES	YES	YES	YES	
DESICCANT PORT	YES	YES	YES	YES	
FORKLIFTABLE	YES	NO	YES	YES	
COVER LATCHES	8	12	10	10	
COVER LIFT HANDLES	2	NONE	4	4	
COVER LIFT RINGS	NONE	NONE	NONE	2	
BASE LIFT HANDLES	NONE	8	NONE	NONE	
BASE TIE DOWN RINGS	4	NONE	4	4	

TEST SPECIMENS:

AFPTEF fabricated one prototype container of each design in-house for testing. The prototype containers were fabricated IAW all the requirements and tolerances of the container drawing packages. The same drawing packages have been released for the manufacture of production quantities of the containers. Each face of each container was marked with a number for testing identification (see Figure 2).

TEST LOADS:

The heaviest item from each group was chosen as the test load for each of the containers. For containers 2 and 3, dummy loads were fabricated by AFPTEF that matched the weights and dimensions of Landing Gear, Fixed (NSN 1620-01-231-1831) (see Figure 6) and Shaft Assembly (NSN 1615-01-158-5788) (see Figure 7) respectively. For containers 5 and 6, the actual items, Control, Swashplate (NSN 1615-01-199-7646) (see Figure 8) and Support Structure (NSN 1560-

01-237-3689) (see Figure 9) respectively were obtained on loan from the Corpus Christi Army Depot (CCAD) in Texas.

TEST PROCEDURES:

The ATCOM 2, 5, and 6 containers were tested in accordance with the Air Force Packaging Technology & Engineering Facility (AFPTEF) standard long life container test. The ATCOM 3 container was tested under a modified form of the test plan since the container design was a departure from standard design. Both test plans referenced MIL-STD-648A and FED-STD-101C (see Appendix 1 for test plans).

The test methods specified in each container test plan constitute the procedure for performing the tests on that container. The performance criteria for evaluation of container acceptability was specified at 45 G's maximum and an initial and final leak rate of 0.0035 kg/cm²/hr (0.05 psi/hr) on all four containers. These tests are commonly applied to special shipping containers providing rough handling protection to sensitive items. The tests were performed at AFPTEF, AFMC LSO/LOP, 5215 Thurlow St, Wright-Patterson AFB, OH 45433-5540.

TEST SEQUENCES:

CONTAINER FACE IDENTIFICATION:

The correlation between numbered and designated container sides was as follows:

NUMBERED SIDE	DESIGNATED SIDE ATCOM 2	DESIGNATED SIDE ATCOM 3, ATCOM 5, ATCOM 6
1	Тор	Тор
2	Forward	Forward (Desiccant Port)
3	Bottom	Bottom
4	Aft	Aft
5	Left	Left
6	Right (Desiccant Port)	Right

INSTRUMENTATION (Container # 2)

The simulated load was instrumented with a piezoelectric triaxial accelerometer mounted to its outer surface as close to the items center of mass as possible. Accelerometer positive axis orientations were as follows:

X Axis - Directed through container Side 6 (Longitudinal motion).

Y Axis - Directed through container Side 1 (Vertical motion).

Z Axis - Directed through container Side 2 (Transverse motion).

The following equipment and instrumentation were used:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DUE DATE
Shock Amplifier	Endevco	2740BT	GC11	Nov 96
Shock Amplifier	Endevco	2740BT	GC10	Nov 96
Shock Amplifier	Endevco	2740BT	GC09	Nov 96
Item Accelerometer	Endevco	2223D	FE97	Aug 97
Data Acquisition	GHI Systems	CAT	Ver. 2.11a	N/A

TEST SEQUENCES (Container # 2)

The test sequences are listed in the actual order performed and are labeled by container. With the exception of leak tests, all containers were tested with the appropriate simulated load in place.

LEAK TESTING (Container # 2) - Test Sequences 1 and 8

The following equipment and instrumentation were used:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DUE DATE
Digital Manometer	Yokogawa	2655-22	85DJ6001	Sep 96
Data Acquisition Board	Data Translations	2801A		N/A
Data Acq. Software	Laboratory Technologies	Labtech Notebook		N/A
Vacuum/Pressure Pump	Thomas Industries	TA-0040-V	21663	N/A

TEST SEQUENCE 1 (Container # 2) - FED-STD-101C

Method 5009.3, Leaks in Containers, Pressure Test.

The container pressure relief valve in the desiccant port was removed and the relief valve hole used for attachment of the digital manometer and vacuum/pressure pump lines, and an internal temperature probe. The container was closed and sealed. The leak tests were conducted in accordance with FED-STD-101C, Method 5009.3, at ambient temperature and pressure. The pneumatic pressure leak technique was used and the container was pressurized to 0.1 kg/cm² (1.5 psi). A leak rate of less than 0.0035 kg/cm²/hr (0.05 psi/hr) sustained for a period of at least one half hour was required to pass the test.

ROUGH HANDLING TESTING (Container # 2) - Test sequences 2 through 5.

The following equipment was used for the rough handling tests:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DUE DATE
	Tenney Engineering	12791	N/A	N/A
Pendulum Impact	AFPTEF	N/A	N/A	N/A

TEST SEQUENCE 2 (Container # 2) - FED-STD-101C

Method 5005.1 Cornerwise-Drop (Rotational) Test

Method 5008.1 Edgewise-Drop (Rotational) Test

The container was conditioned at 60°C. The cornerwise-drop tests were conducted in accordance with FED-STD-101C, Method 5005.1 and the edgewise drops in accordance with Method 5008.1. The drop height was 914 mm, Level A. If this height could not be reached the tip over

balance point was used. The container was dropped onto a one-inch thick steel plate inside the environmental chamber. One drop was made on each of two opposite corners and two adjacent sides.

TEST SEQUENCE 3 (Container # 2) - FED-STD-101C

Method 5012, Pendulum-Impact Test

The container was conditioned at 74°C. The pendulum-impact tests were conducted in accordance with FED-STD-101C, Method 5012. The container impact velocity was 2.1 m/second attained by raising the pendulum 22.5 cm. The container was removed from the conditioning chamber and moved quickly to the pendulum for two impacts. One impact was made on each of two adjacent sides.

TEST SEQUENCE 4 (Container # 2) - Test Sequence 2 (Rotational Drop) was repeated at low temperature. The container was conditioned at -29°C. One drop was made on each of two opposite corners and two adjacent edges not used in Sequence 2.

TEST SEQUENCE 5 (Container # 2) - Test Sequence 3 (Pendulum Impact) was repeated at low temperature. The container was conditioned at -54°C. One impact was made on each of two adjacent sides not used in Sequence 3.

VIBRATION TESTING (Container # 2) - Test sequences 6 and 7.

The following equipment and instrumentation were used:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DUE DATE
Servohydraulic Vibration Machine	LAB	41012	89003	N/A
Feedback Hardware Controller	Data Physics Corp.	DP540		N/A
Feedback Software Controller	Data Physics Corp.	Ver. 1.22 7 CH,DWL		N/A
Feedback Shock Amplifier	Endevco	2740BT	FW26	Dec 96

TEST SEQUENCE 6 (Container # 2) - MIL-STD-648A

Paragraph 5.3.2, Resonance Strength and Dwell Test

The container was rigidly attached to the vibration platform. The test was conducted in accordance with MIL-STD-648A, Paragraph 5.3.2, at ambient temperature. A sinusoidal vibration excitation was applied in the vertical direction and cyclically swept for 7.5 minutes at 2 minutes per octave to locate the resonant frequency. Input vibration from 5 to 12.5 Hz was at 0.125 inch double amplitude. Input vibration from 12.5 to 50.0 Hz was at 1.0 G (0 to peak). Transmissibility values during the frequency sweeps were calculated and recorded using the Data Physics software. The peak transmissibility was used to determine the frequency search range for the resonance dwell test.

For resonance dwell testing the vibration controller swept up the frequency range searching for a peak in the transmissibility signal (item vertical axis acceleration divided by table acceleration).

When the peak was identified the controller locked onto and tracked this peak for the 30 minute resonance dwell test.

TEST SEQUENCE 7 (Container # 2) - FED-STD-101C

Method 5019.1, Vibration (Repetitive Shock Test)

A sheet of 3/4-inch plywood was bolted to the top of the vibration table, and the container was placed on the plywood. Restraints were used to prevent the container from sliding off the table. The container was allowed about 1/2-inch unrestricted movement in any direction in the horizontal table plane. The test was conducted in accordance with FED-STD-101C, Method 5019.1, at ambient temperature. Using a constant one inch double amplitude table motion the table frequency was increased from 3.5 Hertz (Hz) until the container left the table surface (approximately 4.5 Hz). When a 1/16 inch thick metal bar could be inserted between table and the container the frequency sweep was halted and the container was allowed to bounce for a 2 hour period.

TEST SEQUENCE 8 (Container # 2) - Test Sequence 1 (<u>Leaks in Containers, Pressure Test</u>) was repeated to determine if previous test sequences had caused any container leaks.

TEST RESULTS (Container # 2)

Test Sequences 1 and 8 - Container Leak Test

The container passed both the initial and final leak tests with a rate less than the maximum allowed leak rate of 0.0035 kg/cm²/hr (0.05 psi/hr).

Test Sequences 2 and 4 - High and Low Temperature Rotational Drop Tests

Impact shock values (Gs) for all drops were below the specified fragility level (45 Gs). No damage to cushioning or simulated item was visible after any of the tests. See Appendix 2, Table 1.

Test Sequences 3 and 5 - Pendulum Impact Tests

Impact shock values (Gs) for all impacts were below the specified fragility level (45 Gs). No damage to cushioning, simulated item or container was visible after the tests. See Appendix 2, Table 2.

Test Sequence 6 - Resonance Strength and Dwell Test

The initial resonant frequency of the container was 9.3 Hz. The controller locked onto and tracked this peak for the 30 minute resonance dwell test. During this period, the maximum transmissibility of the cushioning/container system was 2.7 at resonance. See Appendix 2, Table 3

Test Sequence 7 - Repetitive Vibration Shock Test

No damage was visible to either the cushioning or the simulated load at the end of the 2 hours of testing.

INSTRUMENTATION (Container #3)

The simulated load was instrumented with a piezoelectric triaxial accelerometer mounted to its outer surface as close to the items center of mass as possible (see Figure 11). Accelerometer positive axis orientations were as follows:

X Axis - Directed through container Side 2 (Longitudinal motion).

Y Axis - Directed through container Side 6 (Transverse motion).

Z Axis - Directed through container Side 1 (Vertical motion).

The following equipment and instrumentation were used:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DUE DATE
Shock Amplifier	Endevco	2740BT	FY66	Sep 96
Shock Amplifier	Endevco	2740BT	FY49	Sep 96
Shock Amplifier	Endevco	2740BT	GC09	Nov 96
Item Accelerometer	Endevco	2223D	FE51	Dec 96
Data Acquisition	GHI Systems	CAT	Ver. 2.11a	N/A

TEST SEQUENCES (Container # 3)

The test sequences are listed in the actual order performed and are labeled by container. With the exception of leak tests, all containers were tested with the appropriate simulated load in place.

LEAK TESTING (Container #3) - Test Sequences 1 and 8

The following equipment and instrumentation were used:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DUE DATE
Digital Manometer	Yokogawa	2655-22	85DJ6001	Sep 96
Data Acquisition Board	Data Translations	2801A		N/A
Data Acq. Software	Laboratory Technologies	Labtech Notebook		N/A
Vacuum/Pressure Pump	Thomas Industries	TA-0040-V	21663	N/A

TEST SEQUENCE 1 (Container #3) - FED-STD-101C

Method 5009.3, Leaks in Containers, Pressure Test.

The container pressure relief valve in the desiccant port was removed and the relief valve hole used for attachment of the digital manometer and vacuum/pressure pump lines, and an internal temperature probe. The container was closed and sealed. The leak tests were conducted in accordance with FED-STD-101C, Method 5009.3, at ambient temperature and pressure. The pneumatic pressure leak technique was used and the container was pressurized to 0.1 kg/cm² (1.5 psi). A leak rate of less than 0.0035 kg/cm²/hr (0.05 psi/hr) sustained for a period of at least one half hour was required to pass the test.

ROUGH HANDLING TESTING (Container #3) - Test sequences 2 through 5.

The following equipment was used for the rough handling tests:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DUE DATE
Environmental Chamber	Tenney Engineering	12791	N/A	N/A
Pendulum Impact	AFPTEF	N/A	N/A	N/A

TEST SEQUENCE 2 (Container # 3) - FED-STD-101C

Method 5005.1 Cornerwise-Drop (Rotational) Test

Method 5008.1 Edgewise-Drop (Rotational) Test

The container was conditioned at 60°C. The cornerwise-drop tests were conducted in accordance with FED-STD-101C, Method 5005.1 and the edgewise drops in accordance with Method 5008.1. The drop height was 914 mm, Level A. If this height could not be reached the tip over balance point was used. The container was dropped onto a one-inch thick steel plate inside the environmental chamber. One drop was made on each of two opposite corners and two adjacent sides.

TEST SEQUENCE 3 (Container # 3) - Test Sequence 2 (Rotational Drop) was repeated at low temperature. The container was conditioned at -29°C. One drop was made on each of two opposite corners and two adjacent edges not used in Sequence 2.

VIBRATION TESTING (Container #3) - Test sequences 4 and 5.

The following equipment and instrumentation were used:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DUE DATE
Servohydraulic Vibration Machine	Team Corp.	Special	1988	N/A
Feedback Hardware Controller	Data Physics Corp.	DP540		N/A
Feedback Software Controller	Data Physics Corp.	V2.01.07		N/A
Feedback Shock Amplifier	Endevco	2740BT	FW26	Dec 96

TEST SEQUENCE 4 (Container #3) - MIL-STD-648A

Paragraph 5.3.2, Resonance Strength and Dwell Test

The container was rigidly attached to the vibration platform. The test was conducted in accordance with MIL-STD-648A, Paragraph 5.3.2, at ambient temperature. A sinusoidal vibration excitation was applied in the vertical direction and cyclically swept for 7.5 minutes at 2 minutes per octave to locate the resonant frequency. Input vibration from 5 to 12.5 Hz was at 0.125 inch double amplitude. Input vibration from 12.5 to 50.0 Hz was at 1.0 G (0 to peak). Transmissibility values during the frequency sweeps were calculated and recorded using the Data Physics software. The peak transmissibility was used to determine the frequency search range for the resonance dwell test.

For resonance dwell testing the vibration controller swept up the frequency range searching for a peak in the transmissibility signal (item vertical axis acceleration divided by table acceleration).

When the peak was identified the controller locked onto and tracked this peak for the 30 minute resonance dwell test.

TEST SEQUENCE 5 (Container # 3) - FED-STD-101C

Method 5019.1, Vibration (Repetitive Shock Test)

A sheet of 3/4-inch plywood was bolted to the top of the vibration table, and the container was placed on the plywood. Restraints were used to prevent the container from sliding off the table. The container was allowed about 1/2-inch unrestricted movement in any direction in the horizontal table plane. The test was conducted in accordance with FED-STD-101C, Method 5019.1, at ambient temperature. Using a constant one inch double amplitude table motion the table frequency was increased from 3.5 Hertz (Hz) until the container left the table surface (approximately 4.5 Hz). When a 1/16 inch thick metal bar could be inserted between table and the container the frequency sweep was halted and the container bounced for a 2 hour period.

TEST SEQUENCE 6 (Container # 3) - FED-STD-101C

Method 5016, Superimposed-Load (Stackability, with Dunnage)

Two 2 x 4 pieces of wood were placed lengthwise on container lid stacking points. 1837 kg of lead weights resting on wooden skids were evenly distributed along the 2 x 4's to conform to Level A stacking requirements. This weight remained in place for one hour.

TEST SEQUENCE 7 (Container # 3) - Test Sequence 1 (<u>Leaks in Containers, Pressure Test</u>) was repeated to determine if previous test sequences had caused any container leaks.

TEST RESULTS (Container # 3)

Test Sequences 1 and 7 - Container Leak Test

The container passed both the initial and final leak tests with a rate less than the maximum allowed leak rate of 0.0035 kg/cm²/hr (0.05 psi/hr).

Test Sequences 2 and 3 - High and Low Temperature Rotational Drop Tests

Impact shock values (Gs) for all drops were below the specified fragility level (45 Gs). No damage to cushioning or simulated item was visible after any of the tests. See Appendix 2, Table 1.

Test Sequence 4 - Resonance Strength and Dwell Test

The initial resonant frequency of the container was 13.7 Hz. The controller locked onto and tracked this peak for the 30 minute resonance dwell test. During this period, the maximum transmissibility of the cushioning/container system was 2.8 at resonance. See Appendix 2, Table 3.

Test Sequence 5 - Repetitive Vibration Shock Test

No damage was visible to either the cushioning or the simulated load at the end of the 2 hours of testing.

Test Sequence 6 - Superimposed-Load

No container deformation occurred as a result of this static loading. See Figure 12 for test setup.

INSTRUMENTATION (Container # 5)

The swashplate was instrumented with a piezoelectric triaxial accelerometer mounted to the center of a square aluminum plate one quarter inch thick. This plate was placed on the bottom surface of the item with the accelerometer located inside the item center hole on the items central axis. A second aluminum plate was placed on the top side of this center hole and the two plates clamped together with four bolts through the center hole held the accelerometer in place on the item. Accelerometer positive axis orientations were as follows:

X Axis - Directed through container Side 2 (Longitudinal motion).

Y Axis - Directed through container Side 6 (Transverse motion).

Z Axis - Directed through container Side 1 (Vertical motion).

The following equipment and instrumentation were used:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DUE DATE
Shock Amplifier	Endevco	2740BT	GC11	Nov 96
Shock Amplifier	Endevco	2740BT	GC10	Nov 96
Shock Amplifier	Endevco	2740BT	GC09	Nov 96
Item Accelerometer	Endevco	2223D	FE39	Dec 97
Data Acquisition	GHI Systems	CAT	Ver. 2.11a	N/A

TEST SEQUENCES (Container # 5)

The test sequences are listed in the actual order performed and are labeled by container. With the exception of leak tests, all containers were tested with the appropriate simulated load in place.

LEAK TESTING (Container # 5) - Test Sequences 1 and 8

The following equipment and instrumentation were used:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DUE DATE
Digital Manometer	Yokogawa	2655-22	85DJ6001	Sep 96
Data Acquisition Board	Data Translations	2801A		N/A
Data Acq. Software	Laboratory Technologies	Labtech Notebook		N/A
Vacuum/Pressure Pump	Thomas Industries	TA-0040-V	21663	N/A

TEST SEQUENCE 1 (Container # 5) - FED-STD-101C

Method 5009.3, Leaks in Containers, Pressure Test.

The container pressure relief valve in the desiccant port was removed and the relief valve hole used for attachment of the digital manometer and vacuum/pressure pump lines, and an internal temperature probe. The container was closed and sealed. The leak tests were conducted in

accordance with FED-STD-101C, Method 5009.3, at ambient temperature and pressure. The pneumatic pressure leak technique was used and the container was pressurized to 0.1 kg/cm² (1.5 psi). See Figure 13. A leak rate of less than 0.0035 kg/cm²/hr (0.05 psi/hr) sustained for a period of at least one half hour was required to pass the test.

VIBRATION TESTING (Container # 5) - Test sequences 2 and 3.

The following equipment and instrumentation were used:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DUE DATE
Servohydraulic Vibration Machine	Team Corp.	Special	1988	N/A
Feedback Hardware Controller	Data Physics Corp.	DP540		N/A
Feedback Software Controller	Data Physics Corp.	Ver. 1.22 7 CH,DWL		N/A
Feedback Shock Amplifier	Endevco	2740BT	FW26	Dec 96

TEST SEQUENCE 2 (Container # 5) - MIL-STD-648A

Paragraph 5.3.2, Resonance Strength and Dwell Test

The container was rigidly attached to the vibration platform. The test was conducted in accordance with MIL-STD-648A, Paragraph 5.3.2, at ambient temperature. A sinusoidal vibration excitation was applied in the vertical direction and cyclically swept for 7.5 minutes at 2 minutes per octave to locate the resonant frequency. Input vibration from 5 to 12.5 Hz was at 0.125 inch double amplitude. Input vibration from 12.5 to 50.0 Hz was at 1.0 G (0 to peak). Transmissibility values during the frequency sweeps were calculated and recorded using the Data Physics software. The peak transmissibility was used to determine the frequency search range for the resonance dwell test.

For resonance dwell testing the vibration controller swept up the frequency range searching for a peak in the transmissibility signal (item vertical axis acceleration divided by table acceleration). When the peak was identified the controller locked onto and tracked this peak for the 30 minute resonance dwell test.

TEST SEQUENCE 3 (Container # 5) - FED-STD-101C Method 5019.1, <u>Vibration (Repetitive Shock Test)</u>

A sheet of 3/4-inch plywood was bolted to the top of the vibration table, and the container was placed on the plywood. Restraints were used to prevent the container from sliding off the table. The container was allowed about 1/2-inch unrestricted movement in any direction in the horizontal table plane. The test was conducted in accordance with FED-STD-101C, Method 5019.1, at ambient temperature. Using a constant one inch double amplitude table motion the table frequency was increased from 3.5 Hertz (Hz) until the container left the table surface (approximately 4.5 Hz). When a 1/16 inch thick metal bar could be inserted between table and the container the frequency sweep was halted and the container bounced for a 2 hour period.

ROUGH HANDLING TESTING (Container # 5) - Test sequences 4 through 7.

The following equipment was used for the rough handling tests:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DUE DATE
Environmental Chamber	Tenney Engineering	12791	N/A	N/A
Pendulum Impact	AFPTEF	N/A	N/A	N/A

TEST SEQUENCE 4 (Container # 5) - FED-STD-101C

Method 5005.1 Cornerwise-Drop (Rotational) Test

Method 5008.1 Edgewise-Drop (Rotational) Test

The container was conditioned at 60°C. The cornerwise-drop tests were conducted in accordance with FED-STD-101C, Method 5005.1 and the edgewise drops in accordance with Method 5008.1. The drop height was 914 mm, Level A. If this height could not be reached the tip over balance point was used. The container was dropped onto a one-inch thick steel plate inside the environmental chamber. One drop was made on each of two opposite corners and two adjacent sides.

TEST SEQUENCE 5 (Container # 5) - FED-STD-101C

Method 5012, Pendulum-Impact Test

The container was conditioned at 74°C. The pendulum-impact tests were conducted in accordance with FED-STD-101C, Method 5012. The container impact velocity was 2.1 m/second attained by raising the pendulum 22.5 cm. The container was removed from the conditioning chamber and moved quickly to the pendulum for two impacts. One impact was made on each of two adjacent sides.

TEST SEQUENCE 6 (Container # 5) - Test Sequence 2 (Rotational Drop) was repeated at low temperature. The container was conditioned at -29°C. One drop was made on each of two opposite corners and two adjacent edges not used in Sequence 2.

TEST SEQUENCE 7 (Container # 5) - Test Sequence 3 (Pendulum Impact) was repeated at low temperature. The container was conditioned at -54°C. One impact was made on each of two adjacent sides not used in Sequence 3.

TEST SEQUENCE 8 (Container # 5) - Test Sequence 1 (<u>Leaks in Containers</u>, Pressure <u>Test</u>) was repeated to determine if previous test sequences had caused any container leaks.

TEST RESULTS (Container #5)

Test Sequences 1 and 8 - Container Leak Test

The container passed both the initial and final leak tests with a rate less than the maximum allowed leak rate of 0.0035 kg/cm²/hr (0.05 psi/hr).

Test Sequences 2 and 4 - High and Low Temperature Rotational Drop Tests

Impact shock values (Gs) for all except one drop were below the specified fragility level (45 Gs). Examination of the recorded shock pulse waveforms indicates the presence of a 250 to 350 Hz

signal superimposed on the fundamental pulses. This resonance has been attributed to the accelerometer mounting system and is not a true measure of the shock induced into the item during impact. By using a 200 Hz software filter on the digitized shock pulse data the out of limits pulse from edge 3-5 was reduced by more than 50 percent and therefore, well within the 45 G fragility limit requirement. See Appendix 3, Container #5, Waveforms 1 and 2. No damage to cushioning or simulated item was visible after any of the tests. See Appendix 2, Table 1.

Test Sequences 3 and 5 - Pendulum Impact Tests

Impact shock values (Gs) for all impacts were below the specified fragility level (45 Gs). No damage to cushioning, simulated item or container was visible after the tests. See Appendix 2, Table 2.

Test Sequence 6 - Resonance Strength and Dwell Test

The initial resonant frequency of the container was 7.8 Hz. The controller locked onto and tracked this peak for the 30 minute resonance dwell test. During this period, the maximum transmissibility of the cushioning/container system was 5.6 at resonance. See Appendix 2, Table 3

Test Sequence 7 - Repetitive Vibration Shock Test

No damage was visible to either the cushioning or the simulated load at the end of the 2 hours of testing.

INSTRUMENTATION (Container # 6)

The Bifilar assembly was instrumented with a piezoelectric triaxial accelerometer mounted to a wood block. The block in turn was mounted by its ends between the internal walls of the assembly orienting the accelerometer as close to the items center of mass as possible. Accelerometer positive axis orientations were as follows:

X Axis - Directed through container Side 3 (Vertical motion).

Y Axis - Directed through container Side 6 (Transverse motion).

Z Axis - Directed through container Side 2 (Longitudinal motion).

The following equipment and instrumentation were used:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DUE DATE	
Shock Amplifier	Endevco	2740BT	GC11	Nov 96	
Shock Amplifier	Endevco	2740BT	GC10	Nov 96	
Shock Amplifier	Endevco	2740BT	GC09	Nov 96	
Item Accelerometer	Endevco	2223D	FE39	Dec 97	
Data Acquisition	GHI Systems	CAT	Ver. 2.11a	N/A	

TEST SEQUENCES (Container # 6)

The test sequences are listed in the actual order performed and are labeled by container. With the exception of leak tests, all containers were tested with the appropriate simulated load in place.

LEAK TESTING (Container # 6) - Test Sequences 1 and 8

The following equipment and instrumentation were used:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DUE DATE
Digital Manometer	Yokogawa	2655-22	85DJ6001	Sep 96
Data Acquisition Board	Data Translations	2801A		N/A
Data Acq. Software	Laboratory Technologies	Labtech Notebook		N/A
Vacuum/Pressure Pump	Thomas Industries	TA-0040-V	21663	N/A

TEST SEQUENCE 1 (Container # 6) - FED-STD-101C

Method 5009.3, Leaks in Containers, Pressure Test.

The container pressure relief valve in the desiccant port was removed and the relief valve hole used for attachment of the digital manometer and vacuum/pressure pump lines, and an internal temperature probe. The container was closed and sealed. The leak tests were conducted in accordance with FED-STD-101C, Method 5009.3, at ambient temperature and pressure. The pneumatic pressure leak technique was used and the container was pressurized to 0.1 kg/cm² (1.5 psi). A leak rate of less than 0.0035 kg/cm²/hr (0.05 psi/hr) sustained for a period of at least one half hour was required to pass the test.

VIBRATION TESTING (Container # 6) - Test sequences 2 and 3.

The following equipment and instrumentation were used:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DUE DATE
Servohydraulic Vibration Machine	Team Corp.	Special	1988	N/A
Feedback Hardware Controller	Data Physics Corp.	DP540		N/A
Feedback Software Controller	Data Physics Corp.	Ver. 1.22 7 CH,DWL		N/A
Feedback Shock Amplifier	Endevco	2740BT	FW26	Dec 96

TEST SEQUENCE 2 (Container # 6) - MIL-STD-648A

Paragraph 5.3.2, Resonance Strength and Dwell Test

The container was rigidly attached to the vibration platform. The test was conducted in accordance with MIL-STD-648A, Paragraph 5.3.2, at ambient temperature. A sinusoidal vibration excitation was applied in the vertical direction and cyclically swept for 7.5 minutes at 2 minutes per octave to locate the resonant frequency. Input vibration from 5 to 12.5 Hz was at 0.125 inch double amplitude. Input vibration from 12.5 to 50.0 Hz was at 1.0 G (0 to peak). Transmissibility values during the frequency sweeps were calculated and recorded using the Data Physics software. The peak transmissibility was used to determine the frequency search range for the resonance dwell test.

For resonance dwell testing the vibration controller swept up the frequency range searching for a peak in the transmissibility signal (item vertical axis acceleration divided by table acceleration). When the peak was identified the controller locked onto and tracked this peak for the 30 minute resonance dwell test.

TEST SEQUENCE 3 (Container # 6) - FED-STD-101C

Method 5019.1, Vibration (Repetitive Shock Test)

A sheet of 3/4-inch plywood was bolted to the top of the vibration table, and the container was placed on the plywood. Restraints were used to prevent the container from sliding off the table. The container was allowed about 1/2-inch unrestricted movement in any direction in the horizontal table plane. The test was conducted in accordance with FED-STD-101C, Method 5019.1, at ambient Temperature. Using a constant one inch double amplitude table motion the table frequency was increased from 3.5 Hertz (Hz) until the container left the table surface (approximately 4.5 Hz). When a 1/16 inch thick metal bar could be inserted between table and the container the frequency sweep was halted and the container was allowed to bounce for a 2 hour period.

ROUGH HANDLING TESTING (Container # 6) - Test sequences 4 through 7.

The following equipment was used for the rough handling tests:

EQUIPMENT	MANUFACTURER	MODEL	SN	CAL. DUE DATE
Environmental Chamber	Tenney Engineering	12791	N/A	N/A
Pendulum Impact	AFPTEF	N/A	N/A	N/A

TEST SEQUENCE 4 (Container # 6) - FED-STD-101C

Method 5005.1 Cornerwise-Drop (Rotational) Test

Method 5008.1 Edgewise-Drop (Rotational) Test

The container was conditioned at 60°C. The cornerwise-drop tests were conducted in accordance with FED-STD-101C, Method 5005.1 and the edgewise drops in accordance with Method 5008.1. The drop height was 914 mm, Level A. If this height could not be reached the tip over balance point was used. The container was dropped onto a one-inch thick steel plate inside the environmental chamber. One drop was made on each of two opposite corners and two adjacent sides.

TEST SEQUENCE 5 (Container # 6) - FED-STD-101C

Method 5012, Pendulum-Impact Test

The container was conditioned at 74°C. The pendulum-impact tests were conducted in accordance with FED-STD-101C, Method 5012. The container impact velocity was 2.1 m/second attained by raising the pendulum 22.5 cm. The container was removed from the conditioning chamber and moved quickly to the pendulum for two impacts. One impact was made on each of two adjacent sides.

TEST SEQUENCE 6 (Container # 6) - Test Sequence 2 (Rotational Drop) was repeated at low temperature. The container was conditioned at -29°C. One drop was made on each of two opposite corners and two adjacent edges not used in Sequence 2.

TEST SEQUENCE 7 (Container # 6) - Test Sequence 3 (Pendulum Impact) was repeated at low temperature. The container was conditioned at -54°C. One impact was made on each of two adjacent sides not used in Sequence 3.

TEST SEQUENCE 8 (Container # 6) - Test Sequence 1 (<u>Leaks in Containers, Pressure Test</u>) was repeated to determine if previous test sequences had caused any container leaks.

TEST RESULTS (Container # 6)

Test Sequences 1 and 8 - Container Leak Test

The container passed both the initial and final leak tests with a rate less than the maximum allowed leak rate of 0.0035 kg/cm²/hr (0.05 psi/hr).

Test Sequences 2 and 4 - High and Low Temperature Rotational Drop Tests

Impact shock values (Gs) for all drops were below the specified fragility level (45 Gs). No damage to cushioning or simulated item was visible after any of the tests. See Appendix 2, Table 1.

Test Sequences 3 and 5 - Pendulum Impact Tests

Impact shock values (Gs) for all impacts were below the specified fragility level (45 Gs). No damage to cushioning, simulated item or container was visible after the tests. See Appendix 2, Table 2.

Test Sequence 6 - Resonance Strength and Dwell Test

The initial resonant frequency of the container was 8.5 Hz. The controller locked onto and tracked this peak for the 30 minute resonance dwell test. During this period, the maximum transmissibility of the cushioning/container system was 3.2 at resonance. See Appendix 2, Table 3

Test Sequence 7 - Repetitive Vibration Shock Test

No damage was visible to either the cushioning or the simulated load at the end of the 2 hours of testing.

TEST CONCLUSIONS:

Vibration and leak test results met the quantitative requirements of the test plans for all of the containers. No excessive damage occurred to the cushioning or containers with the test loads. Therefore, these containers are considered to have met all test requirements.

PROJECT CONCLUSIONS:

The design used for containers 2, 5 and 6 was reproven to be sound and adaptable to a wide range of configurations and sizes.

The new design used for container 3 proved to be somewhat difficult to fabricate the first time. The extrusions are small and the walls are a single sheet of aluminum and are susceptible to warping during the welding process. The extrusions are not mitered at the corners, but instead are bent around a large radius to form the container corners. This bending process for the lid extrusion presented initial difficulties by tending to twist due to its asymmetrical cross section.

APPENDIX 1
TEST PLANS

	AIR EODOE	AFPEA PROJECT	NI IMPED.							
		PACKAGING TECHNO			NOMBER.					
		G FACILITY (Container	Test Plan)	95-P-108						
IN.	TIANER SIZE (L x W x D) (N ITERIOR: EX	MILLIMETERS) WEIGHT (Kgs) TERIOR: GROSS: , ITEM:	CUBE (CU. M	QUANTITY:	DATE:					
1357.0 × 357.6 × 162.7 1675.0 × 510.0 × 457 2 89.3 23.6 0.4 1 18 J										
	ITEM NAME: MANUFACTURER:									
	ding Gear, Fixed, D	Oummy Load	AFPTEF							
	AINER NAME:	tainers, Container #2		CONTAINER COST	:					
Cer	iminum Container, <u>nter of gravity and t</u>	Test Load of fixed landing gea	ar or simulated	d load with identical						
COND	ITIONING:	ic down points.								
As r	noted below									
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMET	ERS	CONTAINER ORIENTATION	INSTRU- MENTATION					
1.	EXAMINATION O	F PRODUCT								
	MIL-C-4150 Para. 4.5.3 Table II	The container shall be exam determine conformance with workmanship, and requirem	material.	Ambient temp.	Visual Inspection (VI)					
	OHALITY CONFO	specified in Table II of MIL-0	C-4150.							
2.	WEIGHT TEST.	RMANCE TESTS. Container tare weight shall i	not be	Ambient Temp.	Scale					
	MIL-C-4150	greater than 67.0 kg. Gross weight to be 90.0 kg.		7 unbione romp.	Coale					
	Para. 4.5.4 Para. 4.6.3.6	weight to be 90.0 kg.								
<u>Pe</u> i	formance Tests.									
3.	Reusability									
	MIL-C-4150	The case shall be opened a	nd closed	Ambient Temp.	VI					
		five times to demonstrate re	usability with-	Ambient Temp.	Vi					
		out degradation. Ease of or freedom from interference s	eration and							
		acceptance.	nan constitute							
4.	LEAK TEST									
7.	FED-STD-101	Pneumatic pressure at 6.89	kDe	Tankanat						
	Method 5009.2	0.3 Pa/hr leakage allowed a	fter I	Test performed in ambient	Pressure Transducer					
	(4.7.2)	temperature stabilization. To	temperature stabilization. Test duration co							
	to be a minimum of 30 minutes. compressed air supply.									
ŀ				rry ·						
COMME	NTS:									
					j					
PREPAR			APPROVED BY:	Ted Hinds, Chie	of Container					
Jaso	on Gilreath, Mechar	nical Engineer		Engineering & D						

PAGE 1 OF 4

	*** 50005	AFPEA PROJECT NU	IMRER.				
	AIR FORCE	95-P-108	Jilium's,				
	ENGINEERING						
IN'			gs) ITEM:	CUBE (CU. FT)	j	QUANTITY:	DATE:
	0 V 257 C V 164 7		23.6	0.4		1	18 Jan 96
	NAME:			MANUFACTURER:	:		
	ding Gear, Fixed, D	ummy Load		AFPTEF		CONTAINED COCT.	
ATC	COM Family of Conta	tainers, Container #2				CONTAINER COST:	
PACK Alu	DESCRIPTION: minum Container,	Test Load of fixed landing	ng gea	r or simulated	loa	d with identical	
çer	nter of gravity and tie	e down points.					
As n	noted below						
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PA	ARAMETE	ERS		CONTAINER ORIENTATION	INSTRU- MENTATION
Ę	Verstien Tool						
5. a.	Vibration Test. MIL-STD-648	The case shall be vibra	tod fi	E Ll-+0	1		0.00
a.	Para. 5.3.2	50 Hz at a sweep rate				nbient temp. celerometer	(VI) Tri-axial
1		per minute with a total	ıl sweep	p time of	loc	cated in back,	accelerometer
l	1	7.5 minutes. Case sha for 30 minutes at the p				ttom, lefthand le of case.	to measure G-forces
l	1	resonance.	JIEGO		No	ormal shipping	G-IUICES
•	1					sition	1 .
b.	FED-STD-101	The case shall be vibra	rated fo	or not	Α	mbient temp.	(VI)
J. 1	Method 5019	less than two hours	alou	/ HOL	Ad	ccelerometer	Tri-axial
. !	1						accelerometer
	1					ottom, lefthand de of case.	to measure G-forces
•	1				No	ormal shipping	0-101000
	1				pc	osition	
'	1				i	!	1
'					í	1	1
6.	LEAK TEST				ı	1	1
	FED-STD-101	Pneumatic pressure a				est performed	Pressure
	Method 5009.2 (4.7.2)	0.3 Pa/hr leakage allo	owed at	fter	in :	ambient	Transducer
	(4.1.2)	temperature stabilizati to be a minimum of 30				ondition from ompressed air	or Water Manometer
	1	10 00 2	J 11			ipply.	Indiana.
	1	1		Ì	ı.		ĺ
	1					ļ	1
	1	1					ĺ
COMME	ENTS:						
	кер ву: son Gilreath, M echai	rical Engineer		APPROVED BY:		Ted Hinds, Chief	
Jas	Oli Gilleatii, Mecila	nicai Engineei		J		Engineering & D	resion Branch

	AIR FORCE	AFPEA PROJECT N	UMBER:							
	ENGINEERING						95-P-108			
CONT	TIANER SIZE (L x W x D) (IN ITERIOR: EX	ICHES) TERIOR:	WEIGHT GROSS:	(Kgs)	CUBE (CU. FT)	QUANTITY:	DATE:		
	0 X 357.6 X 162.7 1675.0		1	18 Jan 96						
	ITEM NAME: MANUFACTURER:									
	ding Gear, Fixed, D	ummy Loa	d		AFPTEF					
	COM Container #2						CONTAINER COST:			
PACK	DESCRIPTION: Iminum Container,	Test Load o	of fixed lar	nding gea	r or simulated	d loa	nd with identical	:		
CCI	nter of gravity and ti	<u>e down poi</u>	nts.							
	noted below									
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TE	ST TITLE AN	D PARAMETE	ERS		CONTAINER ORIENTATION	INSTRU- MENTATION		
						\vdash				
7.	ROUGH HANDLII	1								
a.	FED-STD-101 Method 5005.1	Condition			test. or not less		op on diagonally			
	Level A	than 24 h	ours. Dro	p height s	914.4 mm.		posite bottom mers.	Tri-axial accelerometer		
						То	tal of 2 drops.	to measure G-forces		
b.		Cornerwis	se-drop (ro	otational)	test.	D	rop on adjacent	(VI)		
		Condition	to 60°C (-	+5.6/-0) fo	or not less 914.4 mm.	si	sides. Drop on Tri-axial			
		tilali 24 (it	Juis. Dio	p neignt s	914.4 mm.		ues not tested #6	accelerometer to measure		
								G-forces		
C.		Pendulum Condition			oo than		ne impact on a	(VI)		
		24 hours.					de and an end. i otal of two	Tri-axial accelerometer		
				•		im	ipacts.	to measure		
								G-forces		
8.	LEAK TEST									
	FED-STD-101	Pneumati	c pressure	at 6.89	kPa.		st performed	Pressure		
	Method 5009.2 (4.7.2)	0.3 Pa/hr temperatu	leakage a ire stabiliz	Illowed af	ter est duration		ambient ndition from	Transducer		
	` ′	to be a mi	inimum of	30 minut	es.		mpressed air	or Water Manometer		
							pply.			
							}			
İ										
					!					
COMME	NTS:	· · · · · · · · · · · · · · · · · · ·								
PREPAR		–			APPROVED BY:		Ted Hinds, Chief	Container		
Jaso	on Gilreath, Mechar	nical Engine	eer				Engineering & D			

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	AIR FORCE	PACKAGIN	G TE	CHNOL	.OGY &		AFPEA PROJECT N	UMBER:	
ENGINEERING FACILITY (Container Test Plan) CONTIANER SIZE (L x W x D) (INCHES) WEIGHT (Kgs) CUBE (CU. FT) QUANTITY:									
CONT	TIANER SIZE (L x W x D) (IN TERIOR: EXT	ICHES) TERIOR: GI	WEIGHT	(Kgs) . ITEM:	CUBE (CU. FT)	QUANTITY:	DATE:	
	TERIOR: EXT X 357.6 X 162 7 EXT 1675.0 X	(510.0 X 457.2 8	9.3	23.6	0.4		1	18 Jan 96	
	ITEM NAME: Landing Gear, Fixed, Dummy Load MANUFACTURER: AFPTEF								
	AINER NAME: OM Container #2						CONTAINER COST:		
P A (K)	ମାନିନ୍ନୋ ୯୯୬ntainer, T ter of gravity and tie	est Load of fixed by down points.	ed lan	ding gear	or simulated	load	d with identical		
	TIONING:						<u> </u>		
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST T	ITLE AN	D PARAMETE	ERS		CONTAINER ORIENTATION	INSTRU- MENTATION	
9.	ROUGH HANDLIN	IG TESTS (Lo	w tem	perature	-28.8 deg C.				
a.	FED-STD-101 Method 5005.1 Level A	Condition to -	Cornerwise-drop (rotational) test. Condition to -28.8°C (+0/-5.6) for not less than 24 hours. Drop height 914.4 mm.				op on diagonally posite bottom ners. tal of 2 drops.	(VI) Tri-axial accelerometer to measure G-forces	
b.		Cornerwise-d Condition to - than 24 hours	28.8°C	C (+0/-5.6)) for not less	sic sic	rop on adjacent des. Drop on des not tested #6	(VI) Tri-axial accelerometer to measure G-forces	
C.		Pendulum Im Condition at - 24 hours. Im	53.9C	for not le		sic To	ne impact on a de and an end. otal of two apacts.	(VI) Tri-axial accelerometer to measure G-forces	
10.	Pneumatic pressure at 6.89 kPa. Method 5009.2 (4.7.2) Pneumatic pressure at 6.89 kPa. 0.3 Pa/hr leakage allowed after temperature stabilization. Test duration to be a minimum of 30 minutes. Test performed in ambient condition from compressed air supply. Pressure Transducer or Water Manometer								
COMME	NTS:								
	RED BY:				APPROVED BY	: Т	ed Hinds, Chief,	Container	
Jas	on Gilreath, Mechai	nical Engineer			ŀ	_		sian Dusciele 📱	

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	AID E		- DACKA		-011110			AFPEA PROJECT I	NI IMPER-	
l	ENGINE		E PACKA	GING IE	CHNO	LOGY &			NUMBER.	
_						Test Plan)		95-P-108		
CO	ITIANER SIZE (L x NTERIOR:		MILLIMETERS) TERIOR:	WEIGHT GROSS:	(Kgs)	CUBE (CU. N	1)	QUANTITY:	DATE:	
241	1 X 381 X 426	2438)	408 X 443	68.0	8.2	0.44		1	24 Jan 96	
ITEN	NAME:					MANUFACTURE		<u>'</u>	24 3411 96	
Av	Aviation Spare Parts AFPTEF Prototype									
•	TAINER NAME:							CONTAINER COST:		
	COM Family	of Con	tainers, Co	ntainer #3						
	DESCRIPTION:							***		
-	rurethane foa	m enca	apsulation.	- · · · · · · · · · · · · · · · · · · ·						
	noted below									
1-	PEE STO/S	PEC	1				1			
NO.	AND TEST MET	HOD OR NO'S	TE	ST TITLE AND	D PARAMET	ERS		CONTAINER ORIENTATION	INSTRU- MENTATION	
1.	Leak Test									
a.	FED-STD-		Vacuum I	Retention '	Techniqu	ie,	l A	mbient temp.	Water	
j	Method 500 Procedure		6894 Pa (27.69 in w	vater or 1	.0 psi).	1		Manometer	
	Flocedure	0.1	Aπer tem	perature s	tabilizatio	on, 172.35 Pa i) leakage	1		(WM) or	
	1		allowed o	ver 30 mir	o.ozo ps outes tesi	t duration.			Pressure Transducer	
	ļ						1		(PT)	
b.	FED-STD-1		Pneumatic	Pressure	Techniq	ue,	A	nbient Temp.	Water	
	Method 500 Procedure		10341 Pa	(41.54 in v	water or	1.5 psi).	'"	motoric remp.	Manometer	
	Frocedure	0.3	(0.6923 in	water or 0	abilizatioi 1.025 psi)	n, 172.35 Pa]		(WM) or	
			allowed ov	er 30 mini	utes test	duration.]		Pressure Transducer	
									(PT)	
	Ì									
2.	Rough Han	dling T	ests (Low 7	<u>emperatu</u>	re -29°C)				
a.	FED-STD-1		Cornerwis			_	One	drop on	Visual	
	Method 500		Condition	to -29ºC fo	or not les	s than 24			Inspection (VI)	
	Package Le	vel A	hours. Dro Maximum	op height (610 mm	(24 inches).	bott	om corners.	Tri-axial	
			Waxiiiluiii	45 G S and	owea.		lota	al of 2 drops.	accelerometer	
									to measure G-forces	
b.	FED-STD-1	01	Edgewise-	drop (rota	tional) te	st.	On	e drop on	(VI)	
	Method 500		Condition i	o -29°C fo	or not les	s than 24	bot	tom side and	Tri-axial	
	Package Le	vel A	Maximum	op neignt 6 45 G's allo	310 mm \ Swed	924 inches.		d edges.	accelerometer	
			WW.	10 O 3 and	Jweu.		10	tal of 2 drops.	to measure G-forces	
		ĺ				ĺ				
		}								
COMM	NTS:	<u> </u> .								
	RED BY:		·			APPROVED BY:	T :	ed Hinds, Chief	Container	
Jas	on Gilreath, N	/lechar	nical Engine	er				naineerina & D		

PAGE 1 OF 4

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			PACKA					AFPEA PROJECT N	UMBER:
				·		Test Plan)		95-P-108	
CONT	TIANER SIZE (L x ITERIOR:		ICHES) [ERIOR:	WEIGHT GROSS:	(Kgs) I ITEM:	CUBE (CU. FT)	QUANTITY:	DATE:
	X 381 X 426	2438 X	408 X 443	68.0	8.2	0.44		1	24 Jan 96
	NAME: ation Spare F	Parts				MANUFACTURES AFPTEF	₹:		
	AINER NAME:					741.121		CONTAINER COST:	
ATC	OM Family	of Cont	ainers, Co	ntainer #3					
	DESCRIPTION:							· · · · · · · · · · · · · · · · · · ·	
	urethane foa	m enca	apsulation.						
CONDITIONING: As noted below									
TEST NO.	REF STD/SF AND TEST METI PROCEDURE	HOD OR	т	EST TITLE AND	D PARAMETE	RS		CONTAINER ORIENTATION	INSTRU- MENTATION
					<u> </u>		╁		
3.	Leak Test FED-STD-' Method 500 Procedure	09	10341 Pa After tem (0.6923 ir	ic Pressure (41.54 in perature st water or t ver 30 min	water or tabilizatio 0.025 psi	1.5 psi). n, 172.35 Pa) leakage		mbient temp.	Water Manometer (WM) or Pressure Transducer
4.	* ROUGH I	HANDL	NG TEST	S (High tei	mperatur	e +60°C)			(PT)
a.	FED-STD-1 Method 500 Package Le	05	Condition hours. Dr	Cornerwise-drop (rotational) test. Condition to 60°C for not less than 24 hours. Drop height 610 mm (24 inches).				e drop on gonal opposite tom corners. al of 2 drops.	(VI) Tri-axial accelerometer to measure G-forces
b.	FED-STD-1 Method 500 Package Le	08	Condition hours. Dr	Edgewise-drop (rotational) test. Condition to 60°C for not less than 24 hours. Drop height 610 mm (24 inches). Maximum 45 G's allowed.					(VI) Tri-axial accelerometer to measure G-forces
	5. Leak Test FED-STD-101 Method 5009 Procedure 6.3 Pneumatic Pressure Technique, 10341 Pa (41.54 in water or 1.5 psi). After temperature stabilization, 172.35 Pa (0.6923 in water or 0.025 psi) leakage allowed over 30 minutes test duration. Ambient temp. Water Manometer (WM) or Pressure Transducer (PT)								Manometer (WM) or Pressure Transducer
		es to h	e tested ek	all not be	the ones	tested in test			
	RED BY:		C (63(60 S)	all HOLDE	uie olies			Tadara Arr	
	on Gilreath, I	Mechai	nical Engin	eer		APPROVED BY		Ted Hinds, Chie Engineering & D	

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	AIR FORCE						AFPEA PROJECT I	NUMBER:	
	ENGINEERING		TY (Cor	ntainer	Test Plan)		95-P-108		
CONT	TIANER SIZE (L x W x D) (II ITERIOR: EX	NCHES) TERIOR:	WEIGHT GROSS:	(Kgs) , ITEM:	CUBE (CU. FT	7	QUANTITY:	DATE:	
2411	X 381 X 426 2438)	< 408 X 443	68.0	8.2	0.44		1	24 Jan 96	
	NAME:				MANUFACTURE	R:			
	ation Spare Parts AINER NAME:	····			AFPTEF				
	OM Family of Con	tainers, Co	ntainer #3				CONTAINER COST:		
PACK	DESCRIPTION:								
Polyurethane foam encapsulation.									
	itioning: noted below								
	REF STD/SPEC	<u> </u>				,			
NO. PROCEDURE NO'S TEST TITLE AND PARAMETERS							CONTAINER ORIENTATION	INSTRU- MENTATION	
6.	<u>Vibration Test</u>								
a.	MIL-STD-648	Resonanc	e Survey a	and Dwel	l Test.	Am	bient temp.	(VI)	
	Para 5.3.2	The contain	iner shall b	oe vibrate	ed from 5 Hz			Tri-axial	
		to 50 Hz a	t a sweep with a tot	rate of or al sween	1		accelerometer to measure		
		minutes.	ninutes. Container shall then be G-forces						
			ribrated for 30 minutes at the predominant esonance. Maximum 45 G's allowed						
		Coonance	esonance. Maximum 45 G's allowed.						
b.	FED-STD-101	Repetetive Maximum	Shock To	est.		An	nbient temp.	(VI)	
	Method 5019	waximum	45 G S all	owea.				Tri-axial accelerometer	
						1		to measure	
								G-forces	
7.	Look Took								
′.	Leak Test	Dnoumatic	Droosure	Tashain					
	FED-STD-101 Method 5009	Pneumation 10341 Pa				Ar	nbient temp.	Water	
	Procedure 6.3	After temp	erature sta	abilizatior	n, 172.35 Pa			Manometer (WM) or	
		(0.6923 in						Pressure	
		allowed ov	er su mini	utes test	duration.			Transducer (PT)	
								(P1)	
					:				
COMME	NTS:						***		
PREPAR	RED BY:				APPROVED BY	: .	Ted Hinds Chie	f Container	
Jaso	on Gilreath, Mecha	eer	APPROVED BY: Ted Hinds, Chief, Container Engineering & Design Branch						

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_										
			PACKA					AFPEA PROJECT I	NUMBER:	
				ΓΥ (Cor	ntainer	Test Plan)		95-P-108		
	TANER SIZE (L x V TERIOR:		CHES) ERIOR:	WEIGHT GROSS:	(Kgs) , ITEM:	CUBE (CU. FT)	QUANTITY:	DATE:	
2411	X 381 X 426	2438 X	408 X 443	68.0	8.2	0.44		1	24 Jan 96	
	NAME: ation Spare P	arte			•	MANUFACTURES	₹:			
	AINER NAME:	arts				AFPTEF		CONTAINER COST:		
ATC	OM Family o	of Cont	ainers, Co	ntainer #3				CONTAINER COST.		
	раск деscription: Polyurethane foam encapsulation.									
	CONDITIONING:									
As r	oted below									
TEST NO.	REF STD/SP AND TEST METH PROCEDURE	OD OR	т	EST TITLE ANI	D PARAMETE	ERS		CONTAINER ORIENTATION	INSTRU- MENTATION	
8.	Static Loadi	ng Tes	<u></u> <u>t</u>							
a.								bient temp.	(VI)	
	Method 5016 Container stacking height 4.9 m (1 Package Level A Load weight 1361.2 Kg (3000 lbs.									
	r donage Lo		Loud Worg	1001.2	119 (0000	103.)	ŀ			
9.	Leak Test								1	
FED-STD-101 Pneumatic Pressure Technique Method 5009 10341 Pa (41.54 in water or 1.							Ar	nbient temp.	Water	
	Procedure 6	_	After temp	erature st	abilizatio	n, 172.35 Pa			Manometer (WM) or	
		·	(0.6923 in allowed or	water or (0.025 psi)	leakage			Pressure	
			allowed	vei 30 iiiiii	utes test	duration.			Transducer (PT)	
			•							
							Ì			
						i				
COMME	ENTS:						L		<u>L.</u>	
PREPA	RED BY:					APPROVED BY	: т	ed Hinds Chief	Container	
Jas	on Gilreath, I	Mechai	nical Engin	eer		APPROVED BY: Ted Hinds, Chief, Container Engineering & Design Branch				

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	AID FOROI			AEDEA DOO ISOT						
	AIR FORCE	PACKAGING TECHNO	LOGY &		AFPEA PROJECT NUMBER:					
-		G FACILITY (Container	Test Plan)	95-P-108						
I IN	0 X 1130.6 X 3\$1.2	TERIOR: GROSS: ITEM:	CUBE (CU. M) QUANTITY:	DATE:					
ITEN	1295.0 X	1220.0 X 533.2 161.8 70.0	0.8	1	15 Feb 96					
	ntrol, Swashplate, D)ummy I oad	MANUFACTURE AFPTEF	R:						
	AINER NAME:	January Load	AFFIEF	CONTAINED COOR						
		tainers, Container #5		CONTAINER COST	-					
PACIL	PACK DESCRIPTION: Aluminum Container, Test Load of swashplate control or simulated load with identical center of gravity and tie down points.									
	ITIONING:	ie down points.								
As r	oted below									
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TEST TITLE AND PARAMET	ERS	CONTAINER ORIENTATION	INSTRU- MENTATION					
1.	EXAMINATION C	PRODUCT	PRODUCT							
	MIL-C-4150	The container shall be exam	ined to	Ambiont to	\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \					
	Para. 4.5.3 determine conformance with material.									
	Table II	workmanship, and requirem	workmanship, and requirements as specified in Table II of MIL-C-4150.							
2.	QUALITY CONFO	RMANCE TESTS.								
	WEIGHT TEST.	Container tare weight shall r	Ambient Temp.	Scale						
	MIL-C-4150 Para. 4.5.4	greater than 95.0 kg. Gross weight to be 165.0 kg.	greater than 95.0 kg. Gross							
	Para. 4.6.3.6	weight to be 100.0 kg.			1					
<u>Pe</u>	formance Tests.									
3.	Davischille.									
J.	Reusability MIL-C-4150	T h								
	WIIL-C-4 150	The case shall be opened a five times to demonstrate re	nd closed	Ambient Temp.	Vi					
		out degradation. Ease of op	eration and							
		freedom from interference s	nall constitute							
İ		acceptance.								
4.	LEAK TEST									
Ī	FED-STD-101	Pneumatic pressure at 10.34	kPa.	Test performed	Pressure					
ļ	Method 5009.2 (4.7.2)	od 5009.2 0.3 Pa/hr leakage allowed after in ambient Tra								
	(4.7.2)	temperature stabilization. To to be a minimum of 30 minut	condition from	or Water						
ı		to be a minimum of 30 minut	es.	compressed air supply.	Manometer					
				.1.1						
COMME	NTS:									
PREPAR			APPROVED BY:	Ted Hinds Chic	of Container					
Jasc	on Gilreath, Mechar	nical Engineer	APPROVED BY: Ted Hinds, Chief, Container Engineering & Design Branch							

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							AFPEA PROJECT N	WADED.	
	AIR FORCE								
	ENGINEERING		Y (Cor	ntainer	Test Plan)		95-P-108		
IN		ICHES) FERIOR:	WEIGHT GROSS:	(Kgs) . ITEM:	CUBE (CU. FT)	QUANTITY:	DATE:	
1205.0	0 X 1130.6 X 391.2 1295.0 X 1	220.0 X 533.2	161.8	70.0	0.8		1	15 Feb 96	
	NAME:				MANUFACTURE	₹:			
	trol, Swashplate, D	ummy Load	<u> </u>		AFPTEF				
	AINER NAME: OM Family of Conf	ainers Cor	ntainer #5				CONTAINER COST:		
	DESCRIPTION: minum Container,			oto contr	al ar ainculata	ما ام			
<u> </u>	itel of gravity and the	e down poi	nts.	ale conti	or or simulate	ia 10	ad with identical		
	TIONING:								
Asn	oted below							·	
							CONTAINER ORIENTATION	INSTRU- MENTATION	
5.	Vibration Test.								
a.	MIL-STD-648	The case	shall he vi	ibrated fr	om 5 Hz to	An	nbient temp.	(VI)	
	Para. 5.3.2	50 Hz at a	a sweep ra	ate of one	half octave		celerometer	Tri-axial	
		per minute with a total sweep time of						accelerometer	
							ttom, lefthand le of case.	to measure G-forces	
		resonance		rmal shipping	G-lorces				
			position						
b.	FED-STD-101	The case	shall be vi	brated fo	or not	A	mbient temp.	(VI)	
	Method 5019	less than					ccelerometer	Tri-axial	
							cated in back,	accelerometer	
							ottom, lefthand de of case.	to measure G-forces	
						No	ormal shipping	0.000	
						pc	sition		
6.	LEAK TEST								
ł	FED-STD-101	Pneumati	c pressure	at 10.34	kPa.		st performed	Pressure	
	Method 5009.2 (4.7.2)	0.3 Pa/hr	leakage a	llowed at	ter est duration		ambient ndition from	Transducer	
	/	to be a m	inimum of	30 minut	es.		mpressed air	or Water Manometer	
							pply.	w.d.rometer	
					,				
1									
COMME	NTS:								
PREPAR	RED BY:				APPROVED BY		Tod Hinds Ol:	f Contai	
	on Gilreath, Mechar	nical Engine	eer		APPROVED BY: Ted Hinds, Chief, Container Engineering & Design Branch				

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	AIR FORCE	PACKAC	SING TE	CHNO	OGY &		AFPEA PROJECT N	UMBER:
00117	ENGINEERING				Test Plan)		95-P-108	
IN	TIANER SIZE (L x W x D) (IN	TERIOR:	WEIGHT GROSS:	(Kgs) ITEM:	CUBE (CU. FT)	QUANTITY:	DATE:
1205.0	0 X 1130.6 X 391.2 1295.0 X 1	220.0 X 533.2	161.8	70.0	0.8		1	15 Feb 96
	NAME:				MANUFACTURE	₹:		
	trol, Swashplate, D	ummy Loac	<u> </u>		AFPTEF			
	AINER NAME: OM Family of Cont	ainers Con	tainer #5				CONTAINER COST:	
Çer	резскіртіом: minum Container, nter of gravity and ti	Test Load o e down poi	f swashpla nts.	ate contr	ol or simulate	d lo	ad with identical	
	TIONING:							
	REF STD/SPEC	T						
NO.	AND TEST METHOD OR PROCEDURE NO'S	TE	ST TITLE AND	PARAMETE	ERS		CONTAINER ORIENTATION	INSTRU- 300 MENTATION
7.	ROUGH HANDLII	IG TESTS	(High tem	perature	60 deg C.		*	
a.	FED-STD-101 Method 5005.1 Level A	Cornerwis Condition than 24 ho	to 60°C (+	-5.6/-0) fo	or not less	op	op on diagonally posite bottom mers. tal of 2 drops.	(VI) Tri-axial accelerometer to measure G-forces
b.	FED-STD-101 Method 5008.1 Level A	Edgewise- Condition than 24 ho	to 60°C (+	·5.6/-Ó) fo	or not less	sic	rop on adjacent des. Total of drops.	(VI) Tri-axial accelerometer to measure G-forces
C.		Pendulum Condition 24 hours.	at 73.9 C	for not le	ss than 13 m/sec.	sid ac To	ne impact on a de and an ljacent end. otal of two pacts.	(VI) Tri-axial accelerometer to measure G-forces
(4.7.2) 0.3 Pa/hr leakage allowed after temperature stabilization. Test duration condition from or V						Pressure Transducer or Water Manometer		
PREPAR					APPROVED BY:		Ted Hinds, Chief	Container
Jasc	on Gilreath, Mechar	nical Engine	er				Engineering & De	

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	AIR FORCE	 -				1	AFPEA PROJECT NU	UMBER:
	ENGINEERING		, 				95-P-108	
	TIANER SIZE (L x W x D) (INITERIOR: EXT	NCHES) TERIOR:	WEIGHT GROSS:	T (Kgs) , ITEM:	CUBE (CU. FT)	,	QUANTITY:	DATE:
<u> </u>	X 1130.6 X 391.2 1295.0 X 12	220.0 X 533.2	1	70.0	0.8		1	15 Feb 96
ontro	NAME: ol, Swashplate, Dum	nmy Load			MANUFACTURER AFPTEF	₹:	•	
	AINER NAME: IM Family of Contain	ners, Conta	ainer #5				CONTAINER COST:	
ANTH cente	PRINCEON ainer, Teser of gravity and tie o	st Load of down point	swashplat	e control	or simulated l	load	with identical	
COND	noted below						-	
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TI	EST TITLE AN	D PARAMETI	ERS		CONTAINER ORIENTATION	INSTRU- MENTATION
9.	ROUGH HANDLIN	NG TESTS	(Low tem	perature	-28.8 deg C.			
a.	FED-STD-101 Method 5005.1 Level A	Condition	se-drop (ro n to -28.8°0 nours. Dro	C (+0/-5.6	test. 6) for not less 812.8 mm.	op	•	(VI) Tri-axial accelerometer
		Mrss		p neigna	712.0	2 d	drops. Drop on	to measure G-forces
b.	FED-STD-101 Method 5008.1 Level A	Condition	Edgewise-drop (rotational) test. Condition to -28.8°C (+0/-5.6) for not less than 24 hours. Drop height 812.8 mm.				des not tested 7b. Total of	(VI) Tri-axial accelerometer to measure G-forces
C.		Condition	Pendulum Impact test. Condition at -53.9C for not less than 24 hours. Impact velocity 2.13 m/sec.				jacent end. pact sides not	(VI) Tri-axial accelerometer to measure G-forces
Method 5009.2 (4.7.2) 0.3 Pa/hr leakage allowed after temperature stabilization. Test duration to be a minimum of 30 minutes. in ambient condition from compressed air supply.						Pressure Transducer or Water Manometer		
COMME	NTS:					-		
PREPA	RED BY:				APPROVED BY:		C Obiof	0.000
	on Gilreath Mechan	nical Engir	.oor		APPROVED BI:	. [Ted Hinds, Chief,	Container

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	AIR FORCE		AFPEA PROJECT NUMBER:							
	ENGINEERING						95-P-108			
CONT	TIANER SIZE (L x W x D) (N		WEIGHT		CUBE (CU. M					
IN		TERIOR:	GROSS:	ITEM:	COBE (CO. M	1)	QUANTITY:	DATE:		
	1397. X	1270. X 1132.1	198.7	63.6	2.0		1	06 Mar 96		
	NAME: ar Assembly, Dumr	my Lood			MANUFACTURE	R:		-		
	AINER NAME:	ily Load			AFPTEF					
ATC	OM Family of Con	tainers, Cor	ntainer #6				CONTAINER COST:			
PASK	DESCRIPTION: Minum Container,	Test Load o	of bifilar as	sembly o	or simulated I	nad	with identical			
	iter or gravity and the	ie down poi	nts.		oirraiatea i		with identical			
	CONDITIONING: As noted below									
TEST AND TEXT										
NO.	AND TEST METHOD OR PROCEDURE NO'S	TE	ST TITLE AND	PARAMETE	RS		CONTAINER ORIENTATION	INSTRU- MENTATION		
1.	EXAMINATION O	F PRODUC	PRODUCT							
	MIL-C-4150 Para. 4.5.3	The conta	iner shall conforma	be exam	1		Visual Inspection (VI)			
	Table II	workmans specified i	ship, and r	equireme			mapeedion (VI)			
2.	QUALITY CONFO	i								
	MIL-C-4150	greater th	tare weig an 140.0 k	kg. Gross	ot be	Α	mbient Temp.	Scale		
	Para. 4.5.4 Para. 4.6.3.6	weight to	be 204.0 k	kg.						
Per	formance Tests.									
							i			
3.	Reusability	_								
	MIL-C-4150	The case	shall be o	pened ar	nd closed usability with-	An	nbient Temp.	VI		
		out degra	dation. Ea	ase of op	eration and					
		freedom fr acceptant	rom interfe	erence sh	nall constitute					
4.	LEAK TEST									
	FED-STD-101	Pneumation	o pressure	at 10.34	. kPa	Te	st performed	Pressure		
	Method 5009.2 (4.7.2)	0.3 Pa/hr	leakage al	llowed af	ter	in a	ambient	Transducer		
- 1	(4.7.2)	temperatu to be a mi	re stabiliza	ation. Te 30 minut	est duration		ndition from mpressed air	or Water		
						oply.	Manometer			
COMME	NTS:				<u>-</u>					
PREPAR					APPROVED BY:	: -	Ted Hinds. Chief	. Container		
Jasc	n Gilreath, Mechar	nical Engine	er		APPROVED BY: Ted Hinds, Chief, Container Engineering & Design Branch					

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		4		AFPEA PROJECT NUMBER:					
	AIR FORCE					ŀ		JMBER:	
	ENGINEERING	FACILI	ry (Con	ıtainer	Test Plan)		95-P-108		
	TANER SIZE (L x W x D) (INTERIOR: EXT	ICHES) TERIOR:	WEIGHT GROSS:	(Kgs) . ITEM:	CUBE (CU. FT)	,	QUANTITY:	DATE:	
	X 1180, X 1022,1	270. X 1132.1	100	63.6	2.0		1	06 Mar 96	
	NAME:				MANUFACTURER	£:			
	ar Assembly, Dumm	ny Load			AFPTEF		r		
	AINER NAME: COM Family of Cont	ainers, Co	ntainer #6				CONTAINER COST:		
PACK	DESCRIPTION: Iminum Container, 1	Γest Load	of bifilar as	sembly o	or simulated lo	ad ·	with identical		
	center of gravity and tie down points.								
As n	oted below								
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	Ti	EST TITLE AND) PARAMETI	ERS		CONTAINER ORIENTATION	INSTRU- MENTATION	
5.	Vibration Test.								
a.	MIL-STD-648	The case	shall be v	ibrated fi	rom 5 Hz to	Ar	nbient temp.	(VI)	
	Para. 5.3.2	50 Hz at	a sweep га	ate of one	e half octave	Ac	celerometer	Tri-axial	
	†		te with a to		p time of n be vibrated		cated in back,	accelerometer	
			tes. Case : nutes at the			ttom, lefthand de of case.	to measure G-forces		
ļ		resonanc		p b	111100	No	ormal shipping	0 .0.000	
	!					ро	sition		
b.	FED-STD-101	The case	shall be vi	ibrated fo	or not	A	mbient temp.	(VI)	
-	Method 5019		two hours			A	ccelerometer	Tri-axial	
		ĺ					ocated in back, ottom, lefthand	accelerometer to measure	
		ĺ					ide of case.	G-forces	
<u> </u>	1	ĺ					ormal shipping		
		ĺ				po	osition		
		l							
						ĺ			
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COMME	INTS:								
				-					
	кер ву: on Gilreath, Mechai	nical Engir	- Jeer		APPROVED BY:	:	Ted Hinds, Chie		
<u> </u>	JII Gilleath, Mecha	illuai Liigii	1661				Engineering & D	esign Branch	

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AIR FORCE PACKAGING TECHNOLOGY & ENGINEERING FACILITY (Container Test Plan) CONTIAINER (I. X W X D) (INCHES) INTERIOR: EXTERIOR: EXTERIOR: EXTERIOR: GROSS: ITEM: 1397. X 1270. X 1132. 198.7 63.6 2.0 1 06 Mar 96 ITEM NAME: History of Containers, Container #6 CONTIAINER NAME: AFPTEF CONTAINER COST: CONTAINE
CONTAINER SIZE (L x W x D) (INCHES) MCROSS: ITEM: 1307. X 1180. X 1021.1 1397. X 1270. X 1132.1 1397. X 1270. X 1132.1 198.7
INTERIOR: 1397. X 1270. X 1132: 198.7 63.6 2.0 1 06 Mar 96 ITEM NAME: Bifilar Assembly, Dummy Load CONTAINER NAME: ATCOM Family of Containers, Container #6 PACLOESINTION: Container, Test Load of bifilar assembly or simulated load with identical center of gravity and tie down points. As noted below TEST NO. NO. PROCEDURE NO'S EXTENDIBLE OF THE NAME: AS NOTED TO THE NAME OF THE NAME
1307. X 1180. X 1022.1 [1397. X 1270. X 1132.1 198.7 63.6 2.0 1 06 Mar 96 ITEM NAME: Bifilar Assembly, Dummy Load CONTAINER NAME: AFPTEF CONTAINER NAME: Bifilar Assembly of Containers, Container #6 PACK DESCRIPTION on Tainer, Test Load of bifilar assembly or simulated load with identical center of gravity and tie down points. CONDITIONING: As noted below TEST NO. NO. PROCEDURE NO'S REF STDISPEC AND TEST METHOD OR PROCEDURE NO'S AND TEST METHOD OR PROCEDURE NO'S CONTAINER COST: CONTAINER COST. CONTAINER COST. CONTAINER COST. CONTAINER COST. CONTAINER COST. CONTAINER COST. CONTAINER COST. CONTAINER COST. CONTAINER COST. CONTAINER COST. CONTAINER COST. CONTAINER COST. CONTAINER COST. CONTAINER COST. CONTAINER COST. CONTAIN
TEM NAME: Bifilar Assembly, Dummy Load
Bifilar Assembly, Dummy Load CONTAINER NAME: ATCOM Family of Containers, Container #6 PACK DESCRIPTION: Center of gravity and tie down points. CONDITIONING: AS NOTED BEIGHT FOR THE PROCEDURE NO'S REF STDISPEC B. ROUGH HANDLING TESTS (High temperature 60 deg C. FED-STD-101 Method 5005.1 Level A B. FED-STD-101 Method 5008.1 Level A COMERNIA DEST METHOD OR TOTAL CONDITION DEST METHOD OR TOTAL
ATCOM Family of Containers, Container #6 PACK DESCRIPTION: Container, Test Load of bifilar assembly or simulated load with identical center of gravity and tie down points. CONDITIONING: AS NOTEST METHOD OR PROCEDURE NO'S TEST NO. AND LEST METHOD OR PROCEDURE NO'S TEST TITLE AND PARAMETERS CONTAINER ORIENTATION TEST TITLE AND PARAMETERS CONTAINER ORIENTATION MERF STDSPEC AND TEST METHOD OR PROCEDURE NO'S TEST TITLE AND PARAMETERS CONTAINER ORIENTATION MENTATION MENTATION INSTRUMENTATION Cornerwise-drop (rotational) test. Condition to 60°C (+5.6/-0) for not less than 24 hours. Drop height 812.8 mm. Edgewise-drop (rotational) test. Condition to 60°C (+5.6/-0) for not less than 24 hours. Drop height 812.8 mm. Drop on diagonally opposite bottom corners. Total of 2 drops. Tri-axial accelerometer to measure G-forces Container Container (NI) Tri-axial accelerometer to measure G-forces Pendulum Impact test. Condition at 73.9 C for not less than 24 hours. Impact velocity 2.13 m/sec. One impact on a side and an adjacent end. Total of two
PACK DESCRIPTION: Aluminum Container, Test Load of bifilar assembly or simulated load with identical center of gravity and tie down points. CONDITIONING: As noted below TEST AND TEST METHOD OR PROCEDURE NO'S 6. ROUGH HANDLING TESTS (High temperature 60 deg C. FED-STD-101 Method 5005.1 Level A Connerwise-drop (rotational) test. Condition to 60°C (+5.6/-0) for not less than 24 hours. Drop height 812.8 mm. Condition to 60°C (+5.6/-0) for not less than 24 hours. Drop height 812.8 mm. Edgewise-drop (rotational) test. Condition to 60°C (+5.6/-0) for not less than 24 hours. Drop height 812.8 mm. Condition to 60°C (+5.6/-0) for not less than 24 hours. Drop height 812.8 mm. Condition to 60°C (+5.6/-0) for not less than 24 hours. Drop height 812.8 mm. Condition at 73.9 C for not less than 24 hours. Impact velocity 2.13 m/sec. Condition to 60°C (VI) Tri-axial accelerometer to measure G-forces Condition at 73.9 C for not less than 24 hours. Impact velocity 2.13 m/sec.
CONDITIONING: As noted below TEST DEST METHOD OR PROCEDURE NO'S EDUCATION MENTATION REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S EDUCATION MENTATION TEST TITLE AND PARAMETERS CONTAINER ORIENTATION MENTATION TO Drop on diagonally opposite bottom corners. Total of 2 drops. Condition to 60°C (+5.6/-0) for not less than 24 hours. Drop height 812.8 mm. Edgewise-drop (rotational) test. Condition to 60°C (+5.6/-0) for not less than 24 hours. Drop height 812.8 mm. Edgewise-drop (rotational) test. Condition to 60°C (+5.6/-0) for not less than 24 hours. Drop height 812.8 mm. Condition to 60°C (+5.6/-0) for not less than 24 hours. Drop height 812.8 mm. Pendulum Impact test. Condition at 73.9 C for not less than 24 hours. Impact velocity 2.13 m/sec. Condition to 60°C (+5.6/-0) for not less than 24 hours. Drop height 812.8 mm. Tri-axial accelerometer to measure G-forces One impact on a side and an adjacent end. Total of two
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24 hours. Impact velocity 2.13 m/sec. adjacent end. accelerometer to measure
Total of two to measure
To modelio
COMMENTS:
PREPARED BY:
APPROVED BY: Ted Hinds, Chief, Container

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	AIR FORCE						AFPEA PROJECT NO 95-P-108	UMBER:
	ENGINEERING		TY (Cor	ntainer	Test Plan)		90-1-100	
CONT	TIANER SIZE (L x W x D) (IN ITERIOR: EXT X 1180. X 1022 1	NCHES) TERIOR:	WEIGHT GROSS:	「(Kgs) , ITEM:	CUBE (CU. FT))	QUANTITY:	DATE:
	1397. X 1	1270. X 1132.1	100 -	63.6	2.0		1	06 Mar 96
	NAME: ar Assembly, Dumm	ny Load			MANUFACTURER AFPTEF	₹:		4
	AINER NAME: COM Family of Cont	tainers, Co	ntainer #6		 		CONTAINER COST:	<u> </u>
PACK	DESCRIPTION: ninum Container, Te	est Load of	bifilar ass	embly or	simulated loa	ad w	ith identical	
cente	er of gravity and tie irioning:	down poin	ts.					
	noted below							I
TEST NO.	REF STD/SPEC AND TEST METHOD OR PROCEDURE NO'S	TI	EST TITLE AND	D PARAMETE	ERS		CONTAINER ORIENTATION	INSTRU- MENTATION
7.	ROUGH HANDLIN	IG TESTS	(Low tem	perature	-28.8 deg C.			
a.	FED-STD-101 Method 5005.1 Level A	Cornerwis Condition	se-drop (ro	otational) C (+0/-5.6	test. 6) for not less	cor	rners. Total of	Tri-axial accelerometer
b.	101	vios	land from	N 4a	-	cor in 7		to measure G-forces
	FED-STD-101 Method 5008.1 Level A	Condition	e-drop (rota i to -28.8°C iours. Drop	C (+0/-5.6)) for not less	sid sid in	des not tested 7b. Total of	(VI) Tri-axial accelerometer to measure G-forces
C.	i	Condition	n Impact te a at -53.9C Impact ve	for not le		sid adj Imj tes	jacent end. pact sides not	(VI) Tri-axial accelerometer to measure G-forces
	LEAK TEST FED-STD-101 Method 5009.2 (4.7.2)	0.3 Pa/hr temperatu	ic pressure leakage al ure stabiliza inimum of	allowed aft cation. Te	fter est duration	in a	est performed ambient ndition from mpressed air pply.	Pressure Transducer or Water Manometer
COmm.	NIS.							
PREPAF	RED BY:				APPROVED BY:		ad Uinda Obief	O4-1
	on Gilreath. Mechan	nical Engin	eer	I	AFFROVED BI.	• '	ed Hinds, Chief,	

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APPENDIX 2

TEST DATA

TABLE 1. Cornerwise and Edgewise Rotational Drops

	+60°C		-29°C	
CONTAINER	IMPACT	PEAK	IMPACT	PEAK
	LOCATION	G	LOCATION	G
ATCOM #2	3-2-5	22	3-2-6	30
	3-4-6	15	3-4-5	38
	3-4	11	3-2	22
	3-5	23	3-6	46
ATCOM #3	3-2-5	21	3-2-6	38
	3-4-6	19	3-4-5	36
	3-4	23	3-2	50
	3-5	17	3-6	31
ATCOM #5	3-2-5	12	3-2-6	17
	3-4-6	11	3-4-5	21
	3-4	12	3-2	15
	3-6	19	3-5	56
ATCOM #6	3-2-5	26	3-2-6	29
	3-4-6	19	3-4-5	27
	3-2	25	3-4	25
	3-5	16	3-6	21

TABLE 2. Pendulum Impacts

	+74°C		-54°C	
CONTAINER	IMPACT	PEAK	IMPACT	PEAK
	FACE	G	FACE	G
ATCOM #2	4	14	2	16
	5	8	6	13
ATCOM #5	2	*	4	11
	5	28	6	13
ATCOM #6	4	26	2	16
	5	30	6	17

^{*} Data not available due to recording equipment malfunction.

TABLE 3. Container Resonant Frequency and Transmissibility Values.

CONTAINER	FREQUENCY	TRANSMISSIBILITY
ATCOM #2	9.3 Hz	2.7
ATCOM #3	13.7 Hz	2.8
ATCOM #5	7.8 Hz	5.6
ATCOM #6	8.5 Hz	3.2

APPENDIX 3 TEST WAVEFORMS

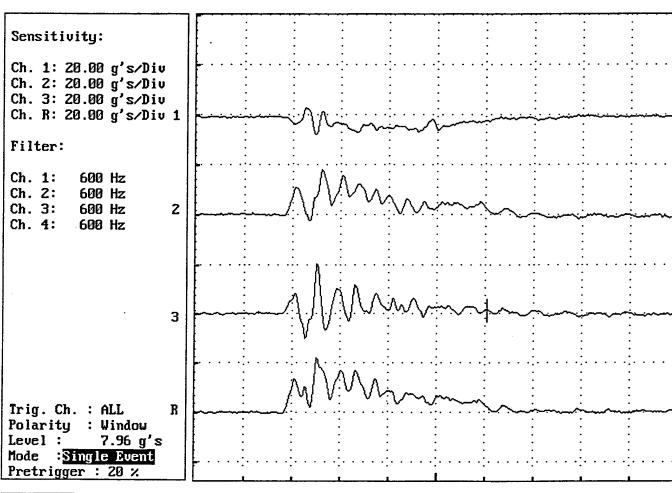
GHI SYSTEMS, INC. CAT SYSTEM

: Mon Feb 12 96 10:21 Date

ROTATIONAL DROP Temp 60 Deg C

TEST ITEM : ATCOM2 TEST ENGINEER : FILSINGER IMPACT POINT : CORNER 235

DROP HEIGHT : 914 mm



СН	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIU	
1	77.31 mS	-1.49 g's	-7.00 g's	-62.45 In/s		12.8 mS	
2	77.31 mS	2.19 g's		130.09 In/s		12.8 mS	
■ 3	77.31 mS	1.25 g's		53.05 In/s		12.8 mS	
R	77.31 mS	2.93 g's	22.45 g's	153.75 In/s		12.8 mS	

Remarks:

Ch-1, X, Longitudinal Axis

Ch-2, Y, Vertical Axis Ch-3, X, Transverse Axis Ch-4, R, Resultant

FED-STD-101C METHOD 5005.1 Level A

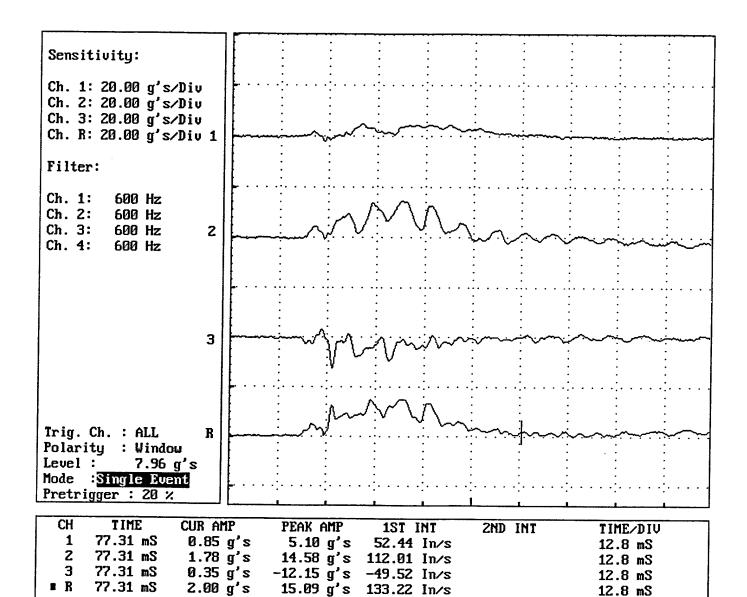
GHI SYSTEMS, INC. CAT SYSTEM

Date : Mon Feb 12 96 10:15

ROTATIONAL DROP TEMP 60 Deg C

TEST ITEM : ATCOM2 TEST ENGINEER: FILSINGER IMPACT POINT : CORNER 346

DROP HEIGHT : 914 mm



15.09 g's 133.22 In/s

Remarks:

R R

Ch-1, X, Longitudinal Axis

Ch-2, Y, Virtical Axis

Ch-3, Z, Transverse Axis Ch-4, R, Resultant

FED-STD-101C METHOD 5005.1 Level A

12.8 mS

GHI SYSTEMS, INC. CAT SYSTEM

: Mon Feb 12 96 10:24 Date

ROTATIONAL DROP Temp 60 Deg C

: ATCOM2 TEST ITEM

TEST ENGINEER : FILSINGER IMPACT POINT : EDGE 35 : 914 mm DROP HEIGHT

Sensitivity:

Ch. 1: 20.00 g's/Div Ch. 2: 20.00 g's/Div Ch. 3: 20.00 g's/Div Ch. R: 20.00 g's/Div 1

Filter:

2 3 R

Trig. Ch. : ALL Polarity : Window Level : 7.96 g's Mode : Single Event Pretrigger: 20 %

Γ	CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIV
	1	77.31 mS	-1.04 g's	-8.61 g's	-59.91 In/s		12.8 mS
	Z	77.31 mS	2.98 g's	22.22 g's	139.15 In/s		12.8 mS
	3	77.31 mS	0.47 g's	19.08 g's	39.66 In/s		12.8 mS
	■ R	77.31 mS	3.19 g's	23.23 g's	156.60 In/s		12.8 mS
L	- 11				100.00 1173		

Remarks:

Ch-1, X, Longitudinal Axis

Ch-2, Y, Vertical Axis

Ch-3, Z, Transverse Axis Ch-4, R, Resultant

FED-STD-101C Method 5008.1 Level A

GHI SYSTEMS, INC. CAT SYSTEM

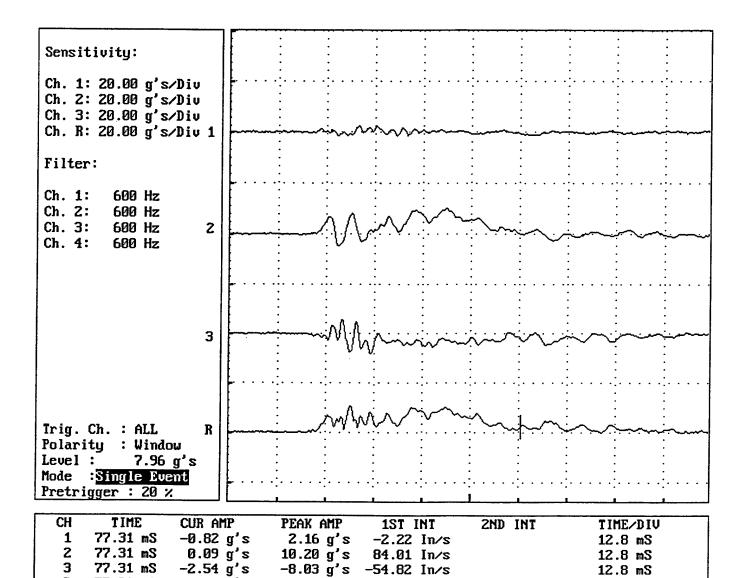
Date : Mon Feb 12 96 10:30

ROTATIONAL DROP Temp 60 Deg C

TEST ITEM : ATCOM2 TEST ENGINEER: FILSINGER

IMPACT POINT : EDGE 34

DROP HEIGHT : 483 mm (Balance Pt)



-8.03 g's

Remarks:

3

n R

Ch-1, Y, Longitudinal Axis

2.67 g's

Ch-2, Y, Vertical Axis Ch-3, Z, Transverse Ch-4, R, Resultant

77.31 mS

77.31 mS

FED-STD-101C

Method 5008.1

Level A

12.8 mS

12.8 mS

-54.82 In/s

10.74 g's 100.34 In/s

GHI SYSTEMS, INC. CAT SYSTEM

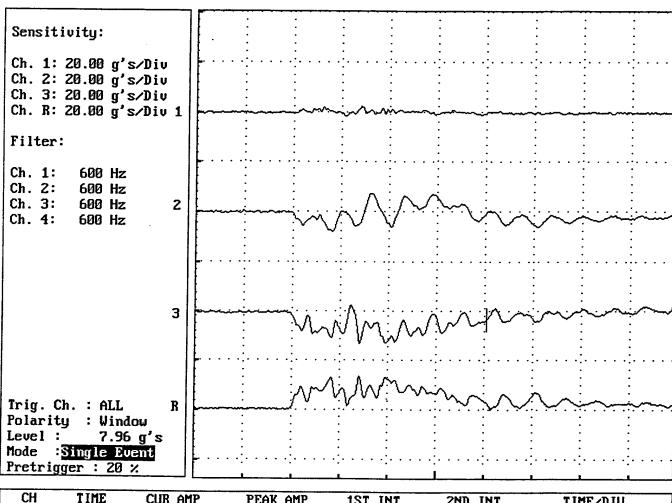
: Tue Feb 13 96 11:32

PENDULUM IMPACT Temp 60 Deg C

TEST ITEM : ATCOM2 TEST ENGINEER : FILSINGER

IMPACT FACE : 4

IMPACT VELOCITY 2.13 m/sec



CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIU
1	77.31 mS	0.25 g's	2.37 g's	3.74 In/s		12.8 mS
2	77.31 mS	0.36 g's	-7.92 g's	-1.82 In/s		12.8 mS
3	77.31 mS	−3.14 α's	-12.54 g's	-116.50 In/s		12.8 mS
R	77.31 mS	3.17 g's	13.51 a's	116.57 In/s		12.8 mS
			==: 3- 9 -			10.0 MU

Remarks:

Ch-1, X, Longitudinal Axis Ch-2, Y, Vertical Axis

Ch-3, Z, Transverse Axis Ch-4, R, Resultant

FED-STD-101C Method 5012

GHI SYSTEMS, INC. CAT SYSTEM

Date : Tue Feb 13 96 11:34

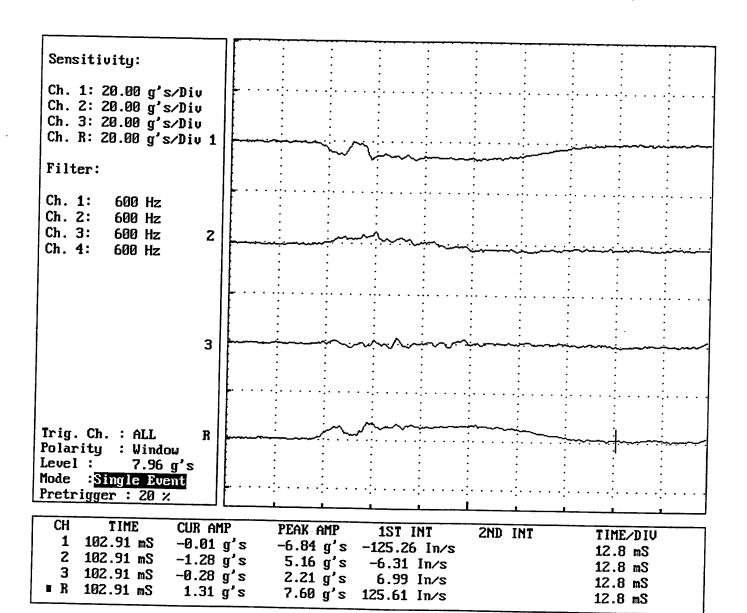
TEST ENGINEER : FILSINGER

PENDULUM IMPACT Temp 60 Deg C

IMPACT FACE : 5

TEST ITEM : ATCOM2

IMPACT VELOCITY 2.13 m/sec



Remarks:

Ch-1, X, Longitudinal Axis

Ch-2, Y, Vertical Axis Ch-3, Z, Transverse Axis

Ch-4, R, Resultant

FED-STD-101C Method 5012

GHI SYSTEMS, INC. CAT SYSTEM

: Fri Feb 16 96 15:14 Date

TEST ENGINEER : FILSINGER IMPACT POINT : Corner 345

ROTATIONAL DROP Temp -28.8 Deg C

TEST ITEM

: ATCOM2

: 914mm DROP HEIGHT

Sensitivity: Ch. 1: 20.00 g's/Div 1 Ch. 2: 20.00 g's/Div Ch. 3: 20.00 g's/Div Ch. R: 20.00 g's/Div 2 Filter: Ch. 1: 600 Hz Ch. 2: 600 Hz Ch. 3: 600 Hz Ch. 4: 600 Hz 3 Trig. Ch. : ALL R Polarity : Window Level: 7.96 g's Mode : Single Event Pretrigger: 20 %

CH	TIME	CUR AMP	PEAK AMP	1ST INT	ZND	INT	TIME/DIV
1	77.31 mS	1.50 g's	-13.17 g's	-39.51 In/s			12.8 mS
2	77.31 mS	-1.79 g's	-35.56 g's	-152.33 In/s			12.8 mS
3	77.31 mS	-2.21 g's	-19.25 g's	15.30 In/s			12.8 mS
■ R	77.31 mS	3.22 g's	38.31 g's	158.11 In/s			12.8 mS

Remarks:

Ch 1, X, Longitudinal Axis

Ch 2, Y, Vertical Axis

Ch 3, Z, Transverse Axis Ch 4, R, Resultant

FED-STD-101C Method 5005.1 Level A

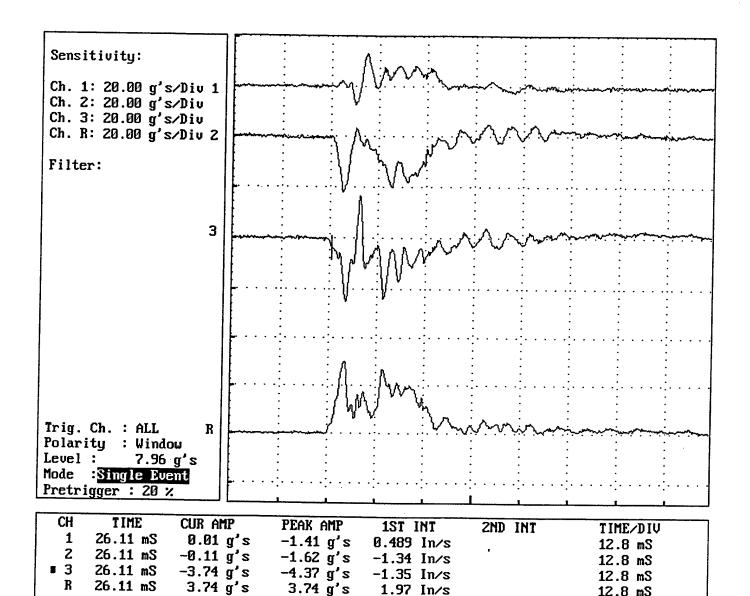
GHI SYSTEMS, INC. CAT SYSTEM

Date : Fri Feb 16 96 15:18

ROTATIONAL DROP Temp -28.8 Deg C

TEST ENGINEER : FILSINGER IMPACT POINT : Corner 236

TEST ITEM : ATCOM2 DROP HEIGHT : 914 mm



Remarks:

Ch 1, X, Longitudinal Axis

Ch 2, Y, Vertical Axis

Ch 3, Z, Transverse Axis

Ch 4, R, Resultant

FED-STE-101C Method 5005.1

Level A

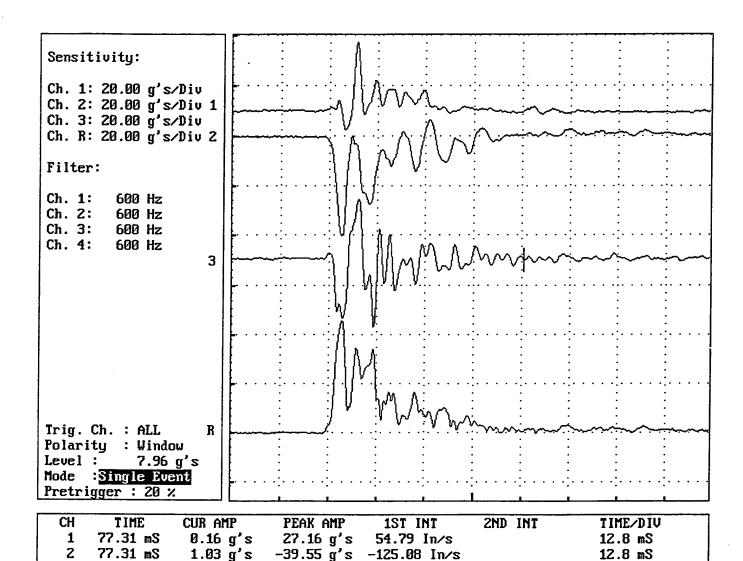
GHI SYSTEMS, INC. CAT SYSTEM

: Fri Feb 16 96 15:22

ROTATIONAL DROP Temp -28.8 Deg C

TEST ITEM : ATCOM2 TEST ENGINEER : FILSINGER IMPACT POINT : Edge 36

DROP HEIGHT : 914 mm



-27.25 g's -24.70 In/s 46.00 g's 138.77 In/s

Remarks:

3

R

Ch 1, X, Longitudinal Axis Ch 2, Y, Vertical Axis

-0.46 g's

1.14 g's

Ch 3, Z, Transverse Axis Ch 4, R, Resultant

77.31 mS

77.31 mS

FED-STD-101C Method 5008.1 Level A

12.8 mS

12.8 mS

GHI SYSTEMS, INC. CAT SYSTEM

Date

: Fri Feb 16 96 15:26

ROTATIONAL DROP Temp -28.8 Deg C

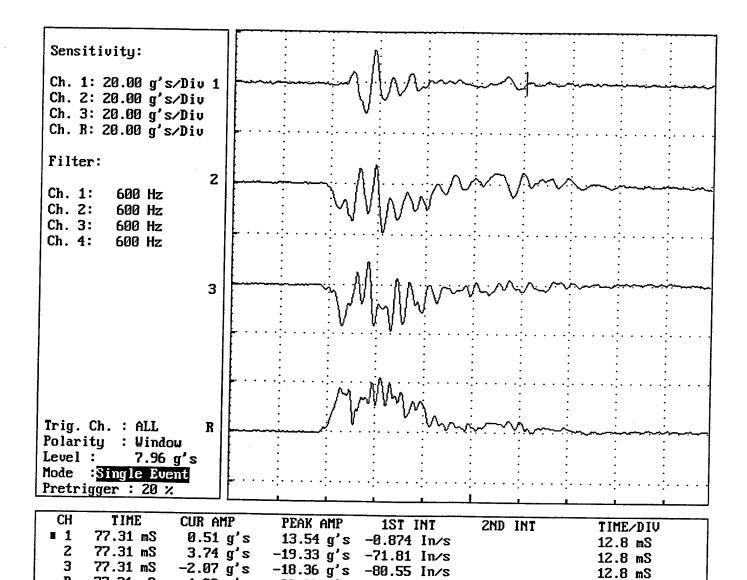
TEST ITEM

: ATCOM2

TEST ENGINEER : FILSINGER

IMPACT POINT : Edge 32

DROP HEIGHT : 470 mm (Balance Pt)



Remarks:

R

Ch 1, X, Longitudinal Axis

4.30 g's

Ch 2, Y, Vertical Axis

77.31 mS

Ch 3, Z, Transverse Axis Ch 4, R, Resultant

FED-STD-101C Method 5008.1 Level A

12.8 mS

46

22.35 g's 107.91 In/s

GHI SYSTEMS, INC. CAT SYSTEM

: Wed Feb 21 96 15:02 Date

TEST ENGINEER : FILSINGER

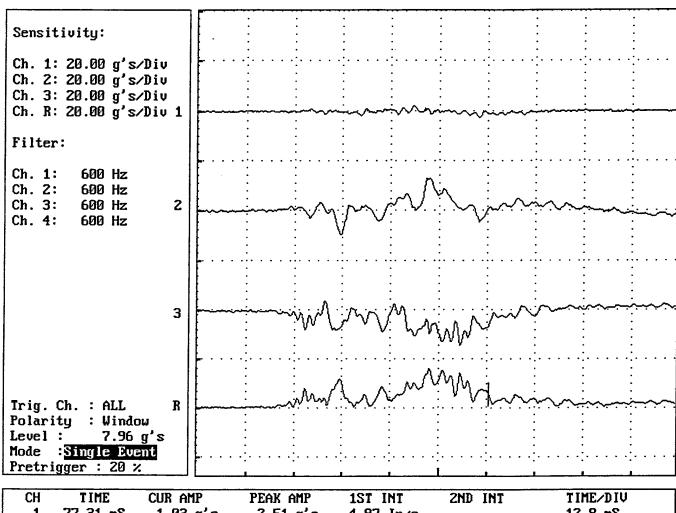
PENDULUM IMPACT Temp -53.9 Deg C

: 2 IMPACT FACE

TEST ITEM

: ATCOM2

IMPACT VELOCITY 2.13 m/sec



CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIV
1	77.31 mS	-1.03 g's	-2.51 g's	-4.97 In/s		12.8 mS
2	77.31 mS	1.72 g's	13.44 g's	41.01 In/s		12.8 mS
				-99.27 In/s		12.8 mS
				107.52 In/s		12.8 mS

Remarks:

Ch 1, X, Longitudinal Axis

Ch 2, Y, Vertical Axis

Ch 3, Z, Transverse Axis Ch 4, R, Resultant

FED-STD-101C Method 5012

GHI SYSTEMS, INC. CAT SYSTEM

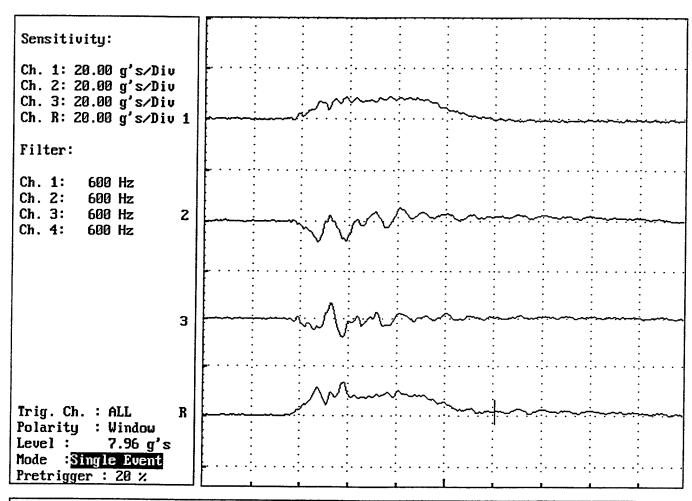
Date : Wed Feb 21 96 14:58

PENDULUM IMPACT Temp -53.9 Deg C

TEST ITEM : ATCOM2 TEST ENGINEER : FILSINGER

IMPACT FACE

IMPACT VELOCITY 2.13 m/sec



CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIU
1	77.31 mS	-0.14 g's	8.92 g's	109.41 In/s		12.8 mS
2	77.31 mS	1.76 g's	-8.37 α's	3.30 In/s		12.8 mS
3	77.31 mS	0.57 g's	-7.73 σ's	-8.63 In/s		12.8 mS
■ R				109.80 In/s		12.8 mS
			g G	105.00 11/3		16.0 110

Remarks:

Ch 1, X, Longitudinal Axis

Ch 2, Y, Vertical Axis Ch 3, Z, Transverse Axis Ch 4, R, Resultant

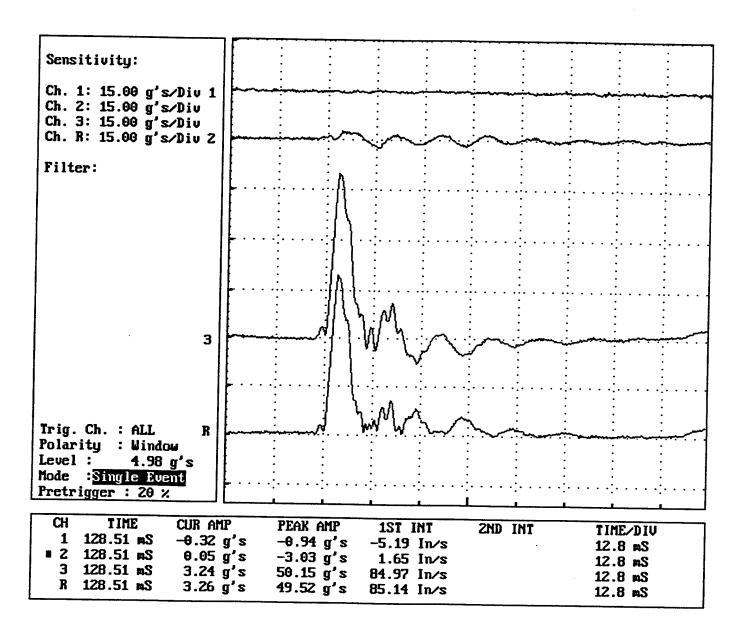
FED-STD-101C Method 5012

GHI SYSTEMS, INC. CAT SYSTEM

Date : Wed Aug 07 96 02:23

Test Engineer : FILSINGER Rotational Drop -28.9DEG C(-20DEG F) Impact Point : EDGE 32

Test Item : ATCOM3 Drop Height : 610mm (24in)



- X-AXIS (LONGITUDINAL MOTION RELATIVE TO DESICANT PORT) CH 1
- CH 2 Y-AXIS (TRANSVERSE MOTION)
- Z-AXIS (VERTICAL MOTION) CH 3
- CH 4 RESULTANT

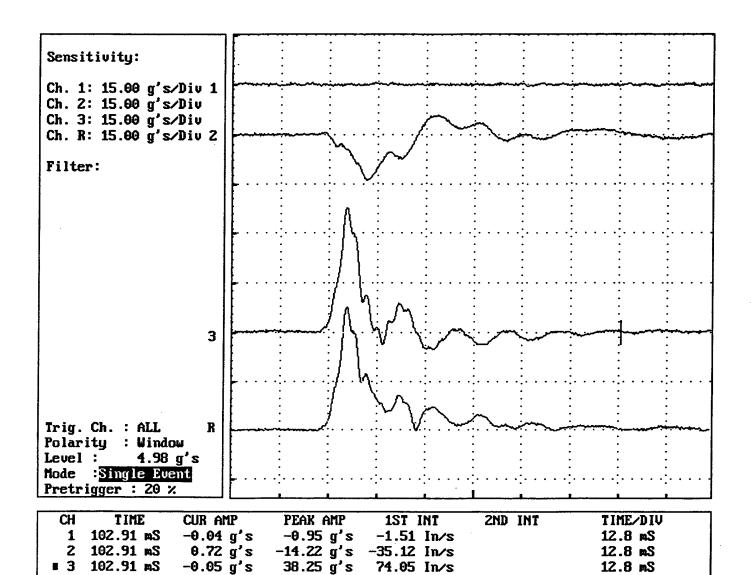
GHI SYSTEMS, INC. CAT SYSTEM

Date : Wed Aug 07 96 02:29

Rotational Drop -28.9DEG C(-20DEG F)
Test Item : ATCOM3

Test Engineer : FILSINGER
Impact Point : CORNER 236
Drop Height : 610mm (24in)

12.8 mS



81.97 In/s

Remarks:

CH 1 X-AXIS (LONGITUDINAL MOTION RELATIVE TO DESICANT PORT)

37.94 g's

CH 2 Y-AXIS (TRANSVERSE MOTION)

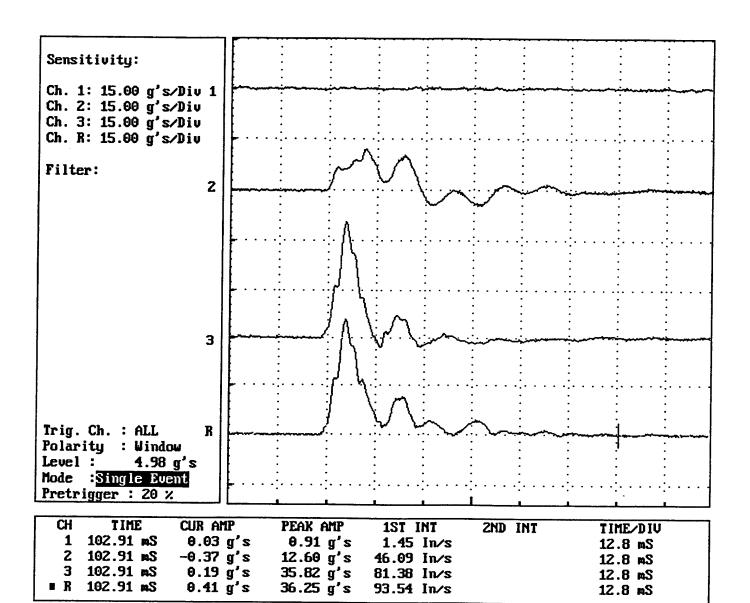
0.72 g's

- CH 3 Z-AXIS (VERTICAL MOTION)
- CH 4 RESULTANT

R 102.91 mS

GHI SYSTEMS, INC. CAT SYSTEM

Date : Wed Aug 07 96 02:36 Test Engineer : FILSINGER Rotational Drop -28.9DEG C(-20DEG F) Impact Point : CORNER 435 Drop Height : 610mm (24in)



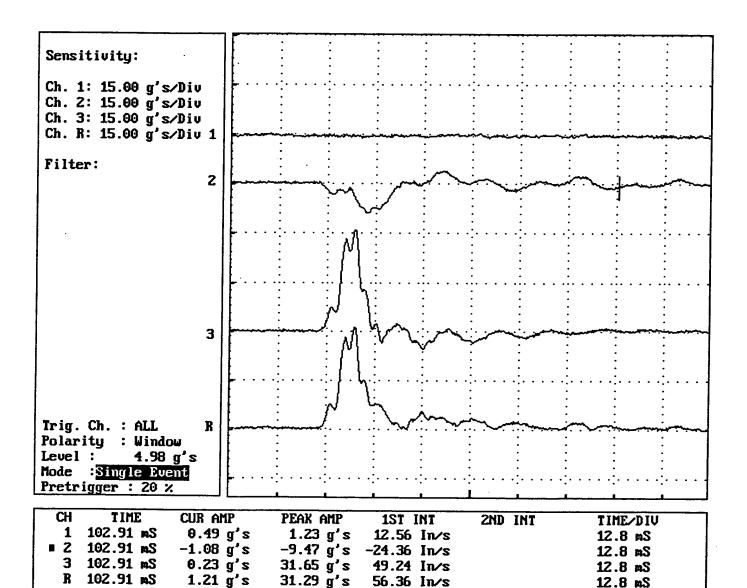
- CH 1 X-AXIS (LONGITUDINAL MOTION RELATIVE TO DESICANT PORT)
- CH 2 Y-AXIS (TRANSVERSE MOTION)
- CH 3 Z-AXIS (VERTICAL MOTION)
- CH 4 RESULTANT

GHI SYSTEMS, INC. CAT SYSTEM

: Wed Aug 07 96 02:40

Test Engineer : FILSINGER Rotational Drop -28.9DEG C(-20DEG F) Impact Point : EDGE 36

Test Item : ATCOM3 Drop Height : 432mm (17in) bal pt

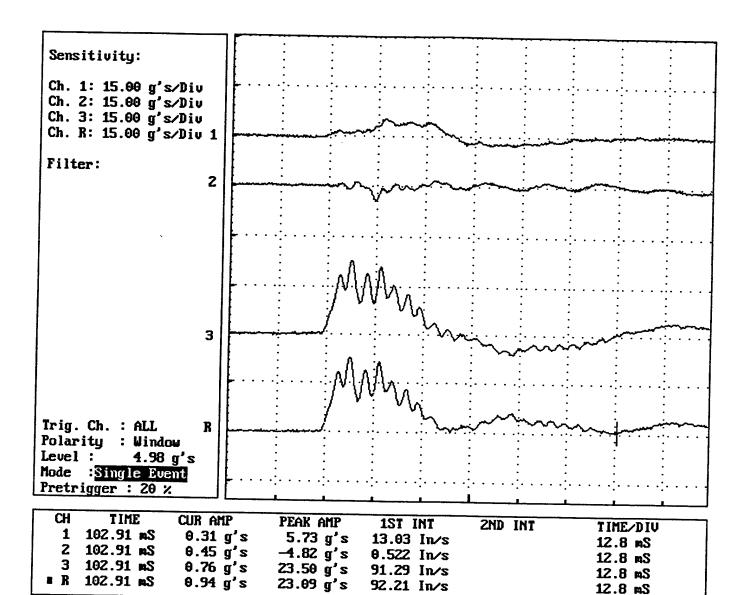


- CH 1 X-AXIS (LONGITUDINAL MOTION RELATIVE TO DESICANT PORT)
- CH 2 Y-AXIS (TRANSVERSE MOTION)
- Z-AXIS (VERTICAL MOTION) CH 3
- CH 4 RESULTANT

GHI SYSTEMS, INC. CAT SYSTEM

Date : Fri Aug 09 96 13:09
Rotational Drop 60 DEG C (140 DEG F)
Test Item : ATCOM3

Test Engineer: FILSINGER
Impact Point: EDGE 34
Drop Height: 24 INCHES



CH	1	X-AXIS	(LONGITUDINAL MOT	ION RELATIVE	TO	DESTCANT	DODW)
OII	2	W BWTO	/mn = ==================================			PESTCWIT	FURI

CH 2 Y-AXIS (TRANSVERSE MOTION)

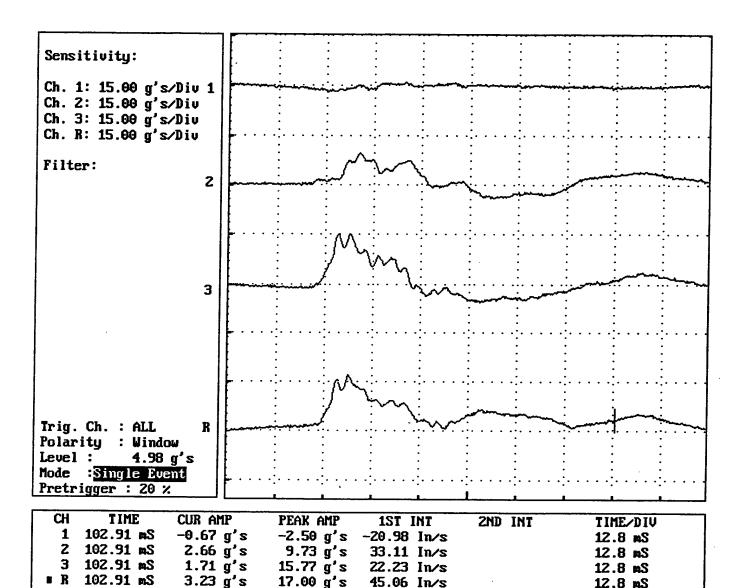
CH 3 Z-AXIS (VERTICAL MOTION)

CH 4 RESULTANT

GHI SYSTEMS, INC. CAT SYSTEM

Date : Fri Aug 09 96 13:17 Test Engineer : FILSINGER Rotational Drop 60 DEG C (140 DEG F) Impact Point : EDGE 35

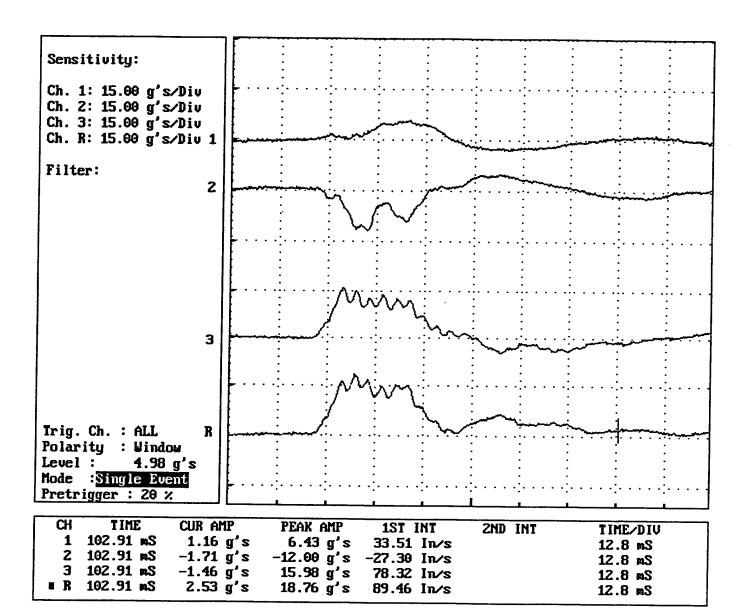
Test Item : ATCOM3 Drop Height : 432mm (17in) bal pt



- CH 1 X-AXIS (LONGITUDINAL MOTION RELATIVE TO DESICANT PORT)
- CH 2 Y-AXIS (TRANSVERSE MOTION)
- CH 3 Z-AXIS (VERTICAL MOTION)
- CH 4 RESULTANT

GHI SYSTEMS, INC. CAT SYSTEM

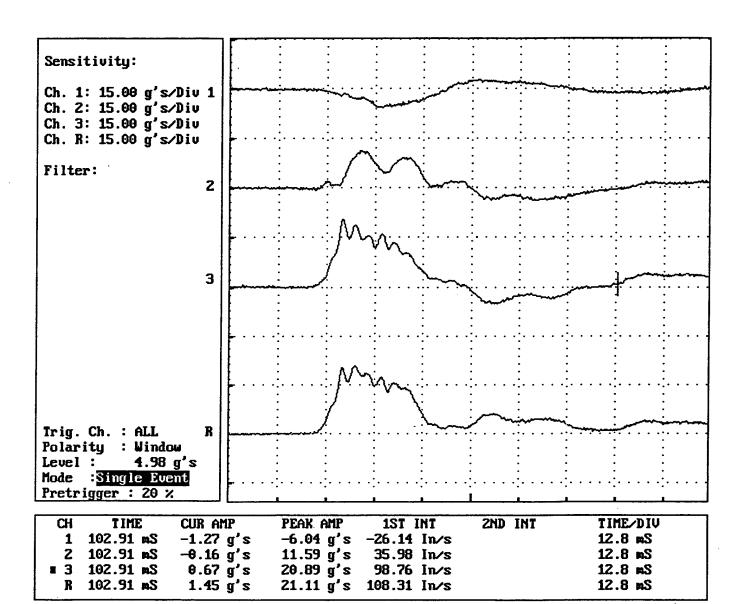
Date : Fri Aug 09 96 13:06 Test Engineer : FILSINGER
Rotational Drop 60 DEG C (140 DEG F) Impact Point : CORNER 436
Test Item : ATCOM3 Drop Height : 610mm (24in)



- CH 1 X-AXIS (LONGITUDINAL MOTION RELATIVE TO DESICANT PORT)
- CH 2 Y-AXIS (TRANSVERSE MOTION)
- CH 3 Z-AXIS (VERTICAL MOTION)
- CH 4 RESULTANT

GHI SYSTEMS, INC. CAT SYSTEM

Date : Fri Aug 09 96 13:14 Test Engineer : FILSINGER Rotational Drop 60 DEG C (140 DEG F) Impact Point : CORNER 235 Test Item : ATCOM3 Drop Height : 24 INCHES



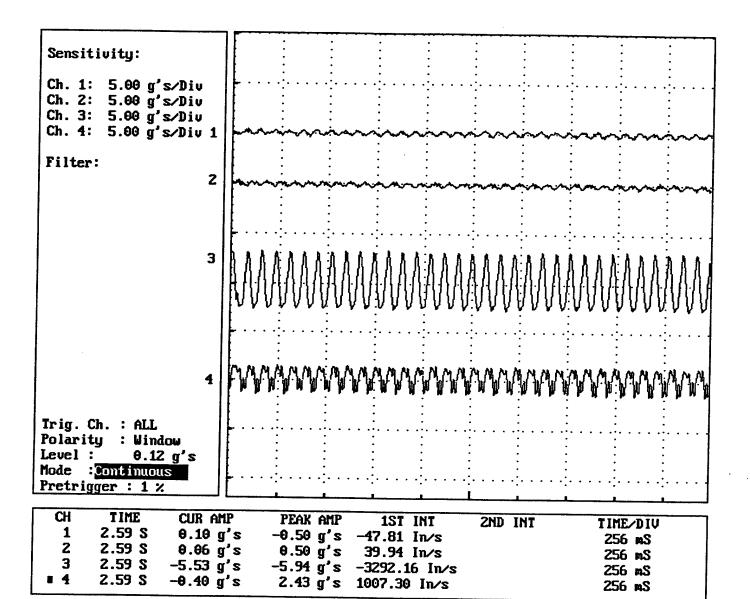
- CH 1 X-AXIS (LONGITUDINAL MOTION RELATIVE TO DESICANT PORT)
- CH 2 Y-AXIS (TRANSVERSE MOTION)
- CH 3 Z-AXIS (VERTICAL MOTION)
- CH 4 RESULTANT

GHI SYSTEMS, INC. CAT SYSTEM

Date : Tue Aug 13 96 14:14 TEST ENGINEER : FILSINGER

RESONANCE DWELL

FREOUENCY : 13.4 HZ TEST ITEM : ATCOM3 TEST TEMP. : 79 DEG F



Remarks:

X-AXIS (LONGITUDINAL MOTION RELATIVE TO DESICANT PORT) CH 1

CH 2 Y-AXIS (TRANSVERSE MOTION)

Z-AXIS (VERTICAL MOTION) CH 3

CH 4 TABLE MOTION

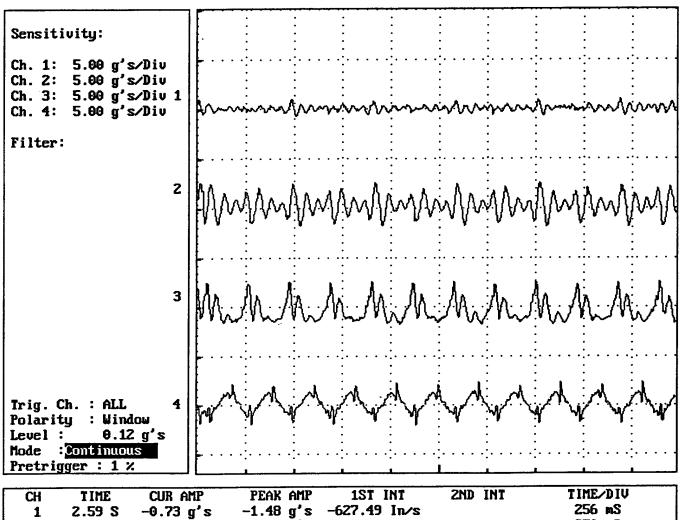
GHI SYSTEMS, INC. CAT SYSTEM

Date : Wed Aug 14 96 10:07

TEST ENGINEER : FILSINGER

REPETITIVE SHCK FREQUENCY (Hz): 4.6

TEST ITEM : ATCOM3 TEST TIME(min): 115



CH	TIME	CUR AMP	PEAK AMP	1ST INT	2ND INT	TIME/DIU
1	2.59 S	-0.73 g's	-1.48 g's	-627.49 In/s		256 mS
1 2		-1.26 g's	-3.30 g's	-911.54 In∕s		256 mS
3				-2100.70 In/s		256 mS
4		1.45 g's		508.07 In/s		256 mS
İ						

Remarks:

CH 1 X-AXIS (LONGITUDINAL MOTION RELATIVE TO DESICANT PORT)

CH 2 Y-AXIS (TRANSVERSE MOTION)

CH 3 Z-AXIS (VERTICAL MOTION)

CH 4 TABLE MOTION

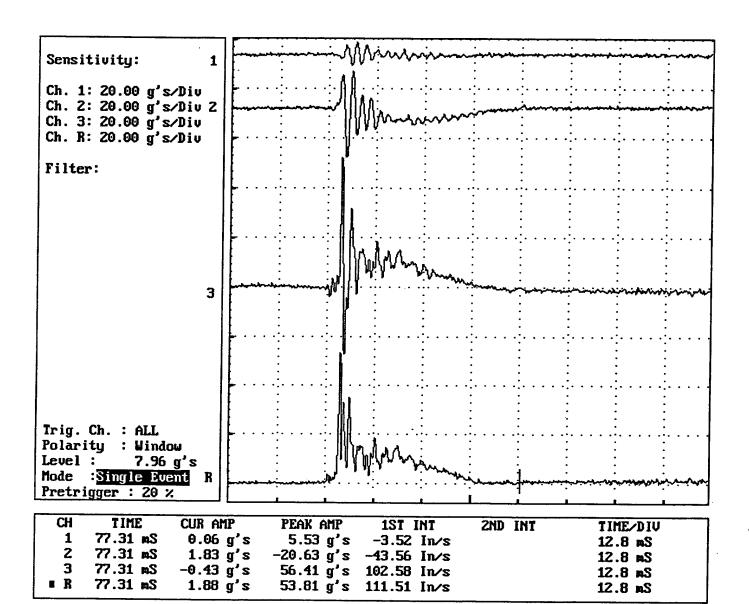
GHI SYSTEMS, INC. CAT SYSTEM

Date : Thu Apr 04 96 14:46

TEST ENGINEER : FILSINGER

ROTATIONAL DROP -28.9DegC (-20DegF) IMPACT POINT : 35

TEST ITEM : ATCOM5 DROP HEIGHT : 812.8mm (32in)



Remarks:

CH 1 X-AXIS (LONGITUDINAL MOTION RELATIVE TO DESICANT PORT)

CH 2 Y-AXIS (TRANSVERSE MOTION)

CH 3 Z-AXIS (VERTICAL MOTION)

CH 4 RESULTANT

GHI SYSTEMS, INC. CAT SYSTEM

Date : Thu Apr 04 96 14:46

TEST ENGINEER : FILSINGER

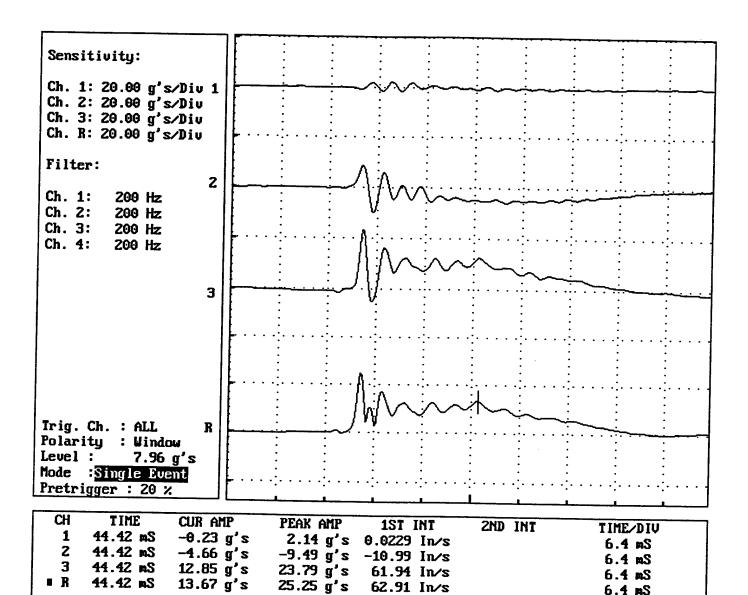
ROTATIONAL DROP -28.9DegC (-20DegF)

IMPACT POINT : 35

TEST ITEM

: ATCOM 5

DROP HEIGHT : 812.8mm (32in)



Remarks:

CH 1 X-AXIS (LONGITUDINAL MOTION RELATIVE TO DESICANT PORT)

CH 2 Y-AXIS (TRANSVERSE MOTION)

CH 3 Z-AXIS (VERTICAL MOTION)

CH 4 RESULTANT

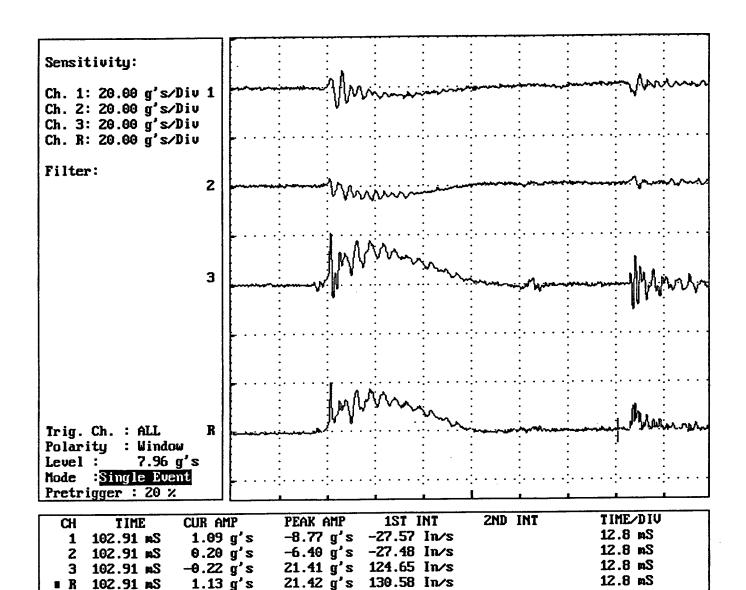
GHI SYSTEMS, INC. CAT SYSTEM

: Thu Apr 04 96 14:42 Date

TEST ENGINEER : FILSINGER IMPACT POINT : CORNER 435 ROTATIONAL DROP -28.9DegC (-20DegF)

: ATCOM5 TEST ITEM

DROP HEIGHT : 812.8mm (32in)



Remarks:

X-AXIS (LONGITUDINAL MOTION RELATIVE TO DESICANT PORT) CH 1

CH 2 Y-AXIS (TRANSVERSE MOTION)

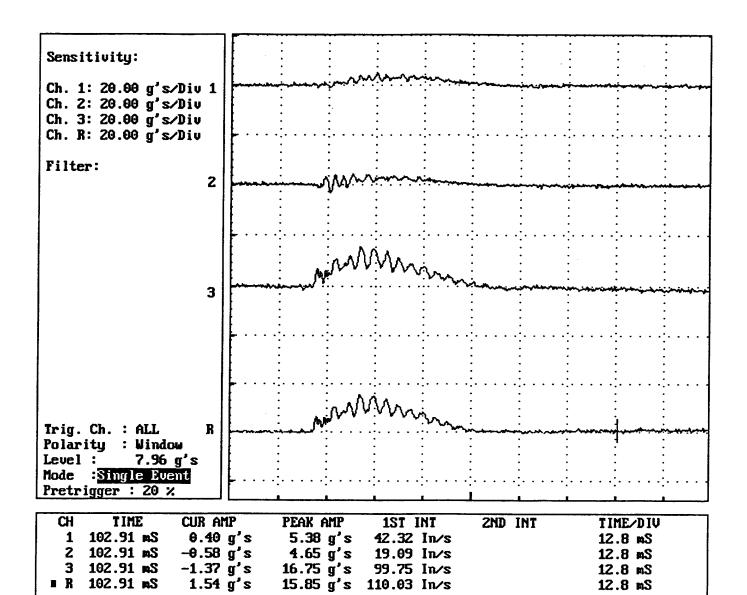
CH 3 Z-AXIS (VERTICAL MOTION)

CH 4 RESULTANT

■ R 102.91 mS

GHI SYSTEMS, INC. CAT SYSTEM

Date : Thu Apr 04 96 14:52 TEST ENGINEER : FILSINGER ROTATIONAL DROP -28.9DegC (-20DegF) IMPACT POINT : CORNER 236 DROP HEIGHT : 812.9mm (32in)



CH 1	X-AXIS	(LONGITUDINAL	MOTION	RELATIVE	TO	DESICANT	PORT)	
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CH 2 Y-AXIS (TRANSVERSE MOTION)

CH 3 Z-AXIS (VERTICAL MOTION)

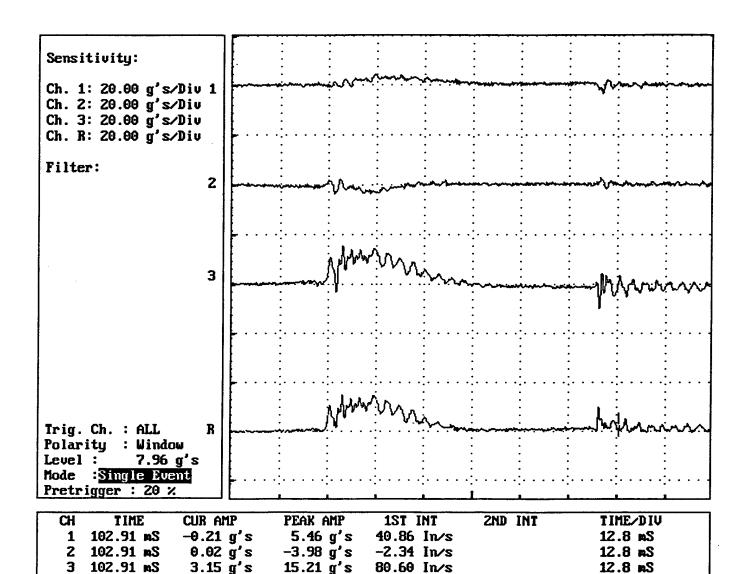
CH 4 RESULTANT

GHI SYSTEMS, INC. CAT SYSTEM

Date : Thu Apr 04 96 14:56 TEST ENGINEER : FILSINGER

ROTATIONAL DROP -28.9DegC (-20DegF) IMPACT POINT : EDGE 32

TEST ITEM : ATCOM5 DROP HEIGHT : 812.8mm (32in)



Remarks:

CH 1 X-AXIS (LONGITUDINAL MOTION RELATIVE TO DESICANT PORT)

15.31 g's

CH 2 Y-AXIS (TRANSVERSE MOTION)

3.16 g's

CH 3 Z-AXIS (VERTICAL MOTION)

CH 4 RESULTANT

■ R 102.91 mS

90.39 In/s

12.8 mS

GHI SYSTEMS, INC. CAT SYSTEM

Date : Wed Apr 10 96 12:51 TEST ENGINEER : FILSINGER ROTATIONAL DROP 60DegC (140DegF) IMPACT POINT : CORNER 235 DROP HEIGHT : 812.8mm (32in)

Sensitivity:		:	:	:	•	:	•	•		:
Ch. 1: 20.00 g's/Div 1 Ch. 2: 20.00 g's/Div Ch. 3: 20.00 g's/Div		: • • • • • • • • • • • • • • • • • • •	: ********** : :			بنجنب		**************************************	•	
Ch. R: 20.00 g's/Div Filter:			·:· · · · : :	• • • • • • • •	·	: : :				
2		·	•	مسمخام معامر شهد - -	ificialist : :	irinii : :				
		•:••••		AJAMAAA	₩ ₩	·····	a. a.Maha			
3		:		'					-	~~~~
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Tain Ch LAIT T		•		MANN'	/ ///	· · · · · · · · · · · · · · · · · · ·			• • • • • • • • • • • • • • • • • • • •	
Trig. Ch.: ALL R Polarity: Window Level: 7.96 g's Mode: Single Event			-						***************************************	~~~~
Pretrigger : 20 % CH TIME CUR A	_	PEAK A		1ST II		ZND I	NT	TIM	E/DIU	
1 102.91 mS -0.01 2 102.91 mS -1.25 3 102.91 mS 1.50 8 R 102.91 mS 1.95	g's g's	-3.94 11.61	gʻs gʻs	35.93 -50.18 149.00 161.27	In/s In/s			12.1 12.1 12.1	8 mS 8 mS 8 mS 8 mS	

Remarks:

CH 1	X-AXIS	(LONGITUDINAL	MOTION	RELATIVE	TO	DESTCANT	POPT1
CH 2	W NWTO	/MD33161111111111111111111111111111111111				22220111	LOKL

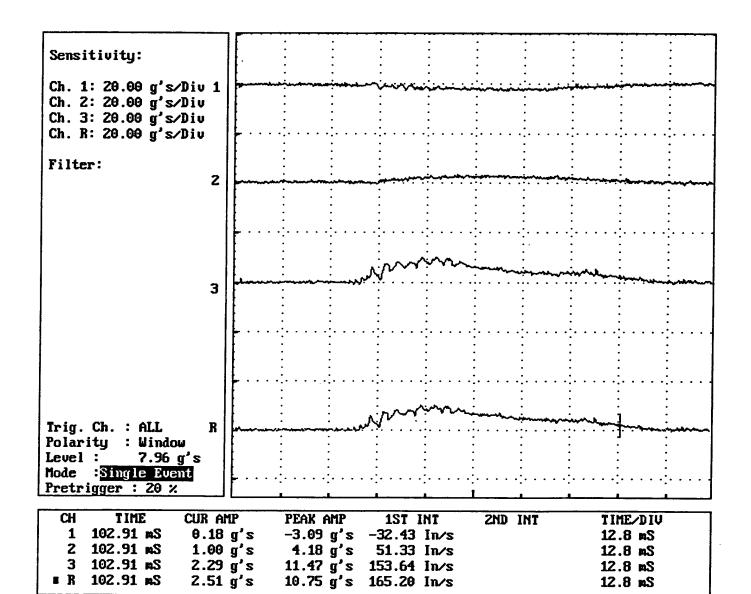
CH 2 Y-AXIS (TRANSVERSE MOTION)
CH 3 Z-AXIS (VERTICAL MOTION)

CH 4 RESULTANT

GHI SYSTEMS, INC. CAT SYSTEM

Date : Wed Apr 10 96 12:57 TEST ENGINEER : FILSINGER ROTATIONAL DROP 60DegC (140DegF) IMPACT POINT : CORNER 346

TEST ITEM : ATCOM5 DROP HEIGHT : 812.8mm (32in)



Remarks:

CH 1 X-AXIS (LONGITUDINAL MOTION RELATIVE TO DESICANT PORT)

CH 2 Y-AXIS (TRANSVERSE MOTION)

CH 3 Z-AXIS (VERTICAL MOTION)

CH 4 RESULTANT

GHI SYSTEMS, INC. CAT SYSTEM

Date : Wed Apr 10 96 13:03

TEST ENGINEER : FILSINGER

ROTATIONAL DROP 60DegC (140DegF) IMPACT POINT : EDGE 36

12.8 mS

TEST ITEM : ATCOM5

DROP HEIGHT : 812.8mm (32in)

Sensitivity: Ch. 1: 20.00 g's/Div 1 Ch. 2: 20.00 g's/Div Ch. 3: 20.00 g's/Div Ch. R: 20.00 g's/Div Filter: 2 3 Trig. Ch. : ALL R Polarity : Window Level: 7.96 g's Mode :Single Event Pretrigger: 20 % CH TIME CUR AMP PEAK AMP 1ST INT 2ND INT TIME/DIU **1** 77.31 mS -0.21 g's 3.85 g's 1.05 In/s 12.8 mS 2 77.31 mS 2.12 g's 4.66 g's 46.49 In/s 12.8 mS 3 77.31 mS 19.36 g's 120.85 In/s 18.29 g's 129.49 In/s 2.86 g's 12.8 mS

Remarks:

CH 1	X-AXIS	(LONGITUDINAL MOTION	RELATIVE TO	O DESTCANT POPTI	
OTT O	** ****			O DEDICTION FORT	,

CH 2 Y-AXIS (TRANSVERSE MOTION)

3.56 g's

CH 3 Z-AXIS (VERTICAL MOTION)

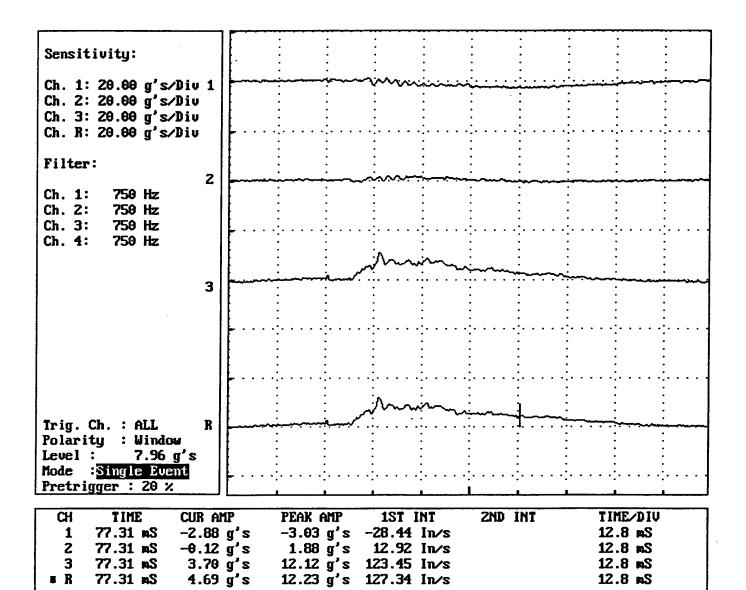
CH 4 RESULTANT

77.31 mS

GHI SYSTEMS, INC. CAT SYSTEM

Date : Wed Apr 10 96 13:07 TEST ENGINEER : FILSINGER ROTATIONAL DROP 60DegC (140DegF) IMPACT POINT : EDGE 34

TEST ITEM : ATCOM5 DROP HEIGHT : 812.8mm (32in)



Remarks:

CH 1 X-AXIS (LONGITUDINAL MOTION RELATIVE TO DESICANT PORT)

CH 2 Y-AXIS (TRANSVERSE MOTION)

CH 3 Z-AXIS (VERTICAL MOTION)

CH 4 RESULTANT

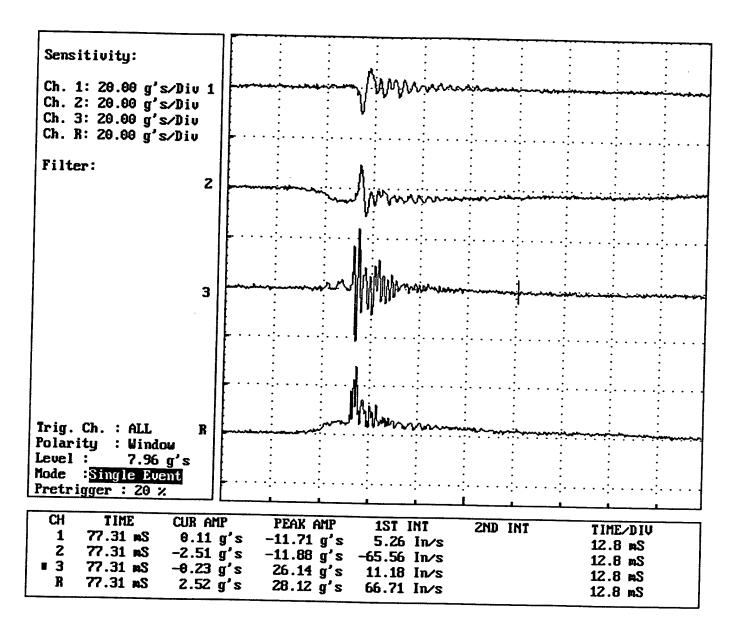
GHI SYSTEMS, INC. CAT SYSTEM

Date : Thu Apr 11 96 08:41

TEST ENGINEER : FILSINGER : 5

PENDULUM IMPACT 73.9DegC (165DegF) IMPACT FACE TEST ITEM

: ATCOM5 IMPACT VELOCITY 2.13m/sec (7ft/sec)



Remarks:

(LONGITUDINAL MOTION RELATIVE TO DESICANT PORT) CH 1 X-AXIS

CH 2 Y-AXIS (TRANSVERSE MOTION)

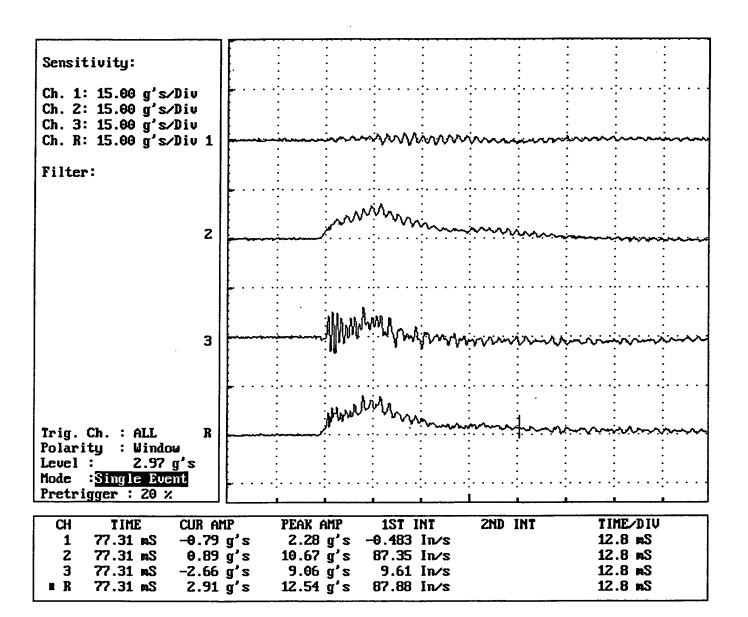
CH 3 Z-AXIS (VERTICAL MOTION)

GHI SYSTEMS, INC. CAT SYSTEM

Date : Fri Apr 12 96 09:35 TEST ENGINEER : FILSINGER

PENDULUM IMPACT -53.9DegC (-65DegF) IMPACT FACE : 6

TEST ITEM : ATCOM5 IMPACT VELOCITY 2.13m/sec (7ft/sec)



Remarks:

CH 1 X-AXIS (LONGITUDINAL MOTION RELATIVE TO DESICANT PORT)

CH 2 Y-AXIS (TRANSVERSE MOTION)

CH 3 Z-AXIS (VERTICAL MOTION)

GHI SYSTEMS, INC. CAT SYSTEM

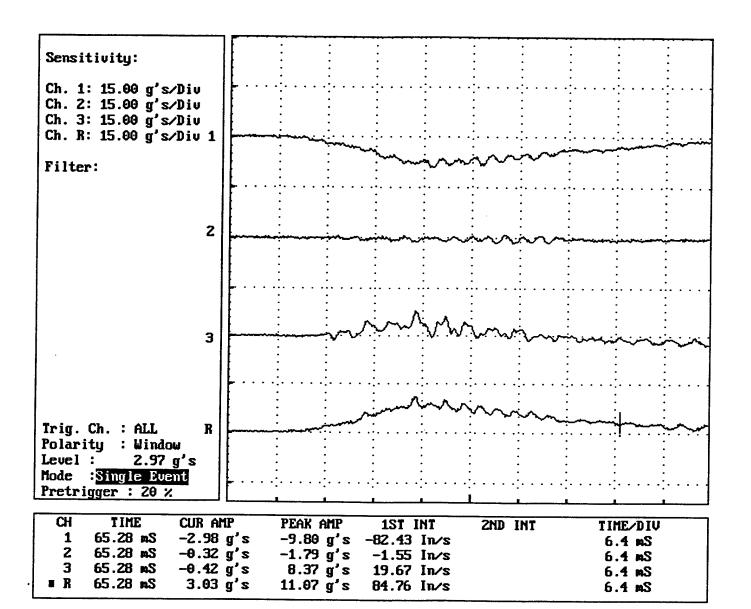
Date : Fri Apr 12 96 09:38 TEST

TEST ENGINEER: FILSINGER

IMPACT FACE

PENDULUM IMPACT -53.9DegC (-65DegF)

TEST ITEM : ATCOM5 IMPACT VELOCITY 2.13m/sec (7ft/sec)



Remarks:

CH 1 X-AXIS (LONGITUDINAL MOTION RELATIVE TO DESICANT PORT)

CH 2 Y-AXIS (TRANSVERSE MOTION)

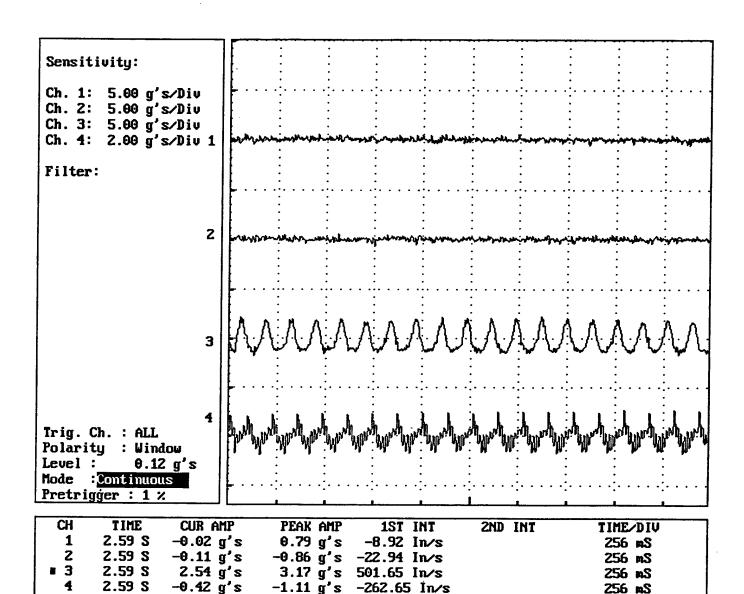
CH 3 Z-AXIS (VERTICAL MOTION)

GHI SYSTEMS, INC. CAT SYSTEM

Date ' : Wed Mar 27 96 14:46 TEST ENGINEER: FILSINGER

RESONANCE DWELL

FREQUENCY (Hz): 7.5 TEST ITEM : ATCOM5 TEST TIME(min): 15



Remarks:

CH 1 X-AXIS (LONGITUDINAL MOTION RELATIVE TO DESICANT PORT)

CH 2 Y-AXIS (TRANSVERSE MOTION)

Z-AXIS (VERTICAL MOTION) CH 3

CH 4 TABLE MOTION

GHI SYSTEMS, INC. CAT SYSTEM

Date : Fri Mar 29 96 15:26

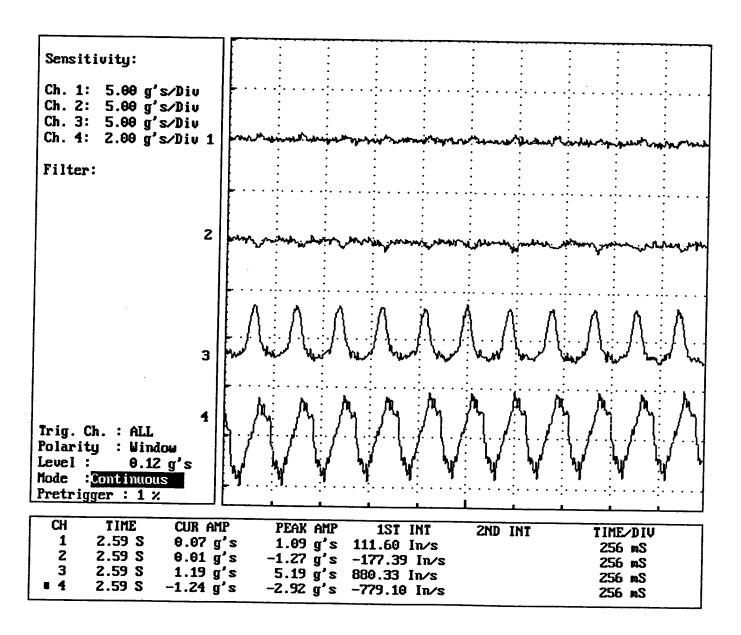
TEST ENGINEER : FILSINGER

REPETITIVE SHCK

FREQUENCY (Hz): 4.4

TEST ITEM : ATCOM5

TEST TIME(min): 70



Remarks:

CH	1	X-AXIS	(LONGITUDINAL MOTIO	N RELATIVE	TΟ	DESTCANT	ושמסמ	
OIT	•	17 33770	(MD > 1.5.51100 a.m 1.5.51			DESTORME	LOUI	

CH 2 Y-AXIS (TRANSVERSE MOTION)

CH 3 Z-AXIS (VERTICAL MOTION)

CH 4 TABLE MOTION

75

GHI SYSTEMS, INC. CAT SYSTEM

: Thu May 02 96 14:51 Test Engineer : FILSINGER Date

Rotational Drop 60Deg C (140Deg F)
Test Item : ATCOM6

Impact Point : 325

Drop Height : 711.2mm (28in)

12.8 mS

CH TIME CUR AM 1 77.31 mS -3.45 2 77.31 mS -1.15	g's		1ST 1 s 109.73 s -26.15	In/s	2ND I	NT	12.	1E/DIV .8 mS .8 mS	
Trig. Ch.: ALL R Polarity: Window Level: 4.98 g's Mode: Single Event Pretrigger: 20 %							\		
		\int)					: : : : : :	
. 3									
			`	: : : :					
Filter:			^ ; · · ·	\.	·~~	~ ~~~	~~	www	- درند
Sensitivity: Ch. 1: 15.00 g's/Div Ch. 2: 15.00 g's/Div Ch. 3: 15.00 g's/Div Ch. R: 15.00 g's/Div 1				بىر _. يەبىر			^~~	w.~	

Remarks:

CH 1 X-AXIS (VERTICAL MOTION)

CH 2 Y-AXIS (TRANSVERSE MOTION RECH 3 Z-AXIS (LONGITUDINAL MOTION) (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)

3.66 g's

CH 4 RESULTANT

77.31 mS

26.13 g's 113.55 In/s

GHI SYSTEMS, INC. CAT SYSTEM

: Thu May 02 96 15:04

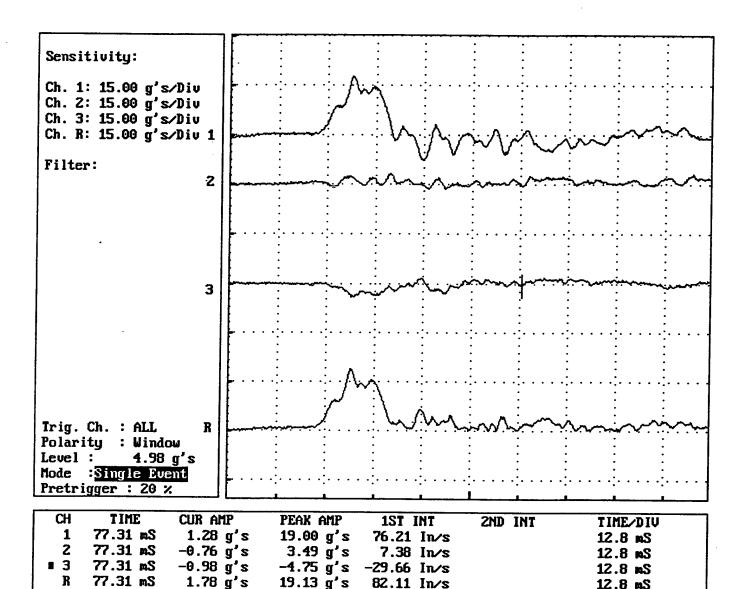
Test Engineer: FILSINGER

Rotational Drop 60Deg C (140Deg F)

Impact Point : 346

Test Item : ATCOM6 Drop Height : 711.2mm (28in)

12.8 mS



Remarks:

CH 1 X-AXIS (VERTICAL MOTION)

CH 2 Y-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)

CH 3 Z-AXIS LONGITUDINAL MOTION)

GHI SYSTEMS, INC. CAT SYSTEM

Date : Thu May 02 96 14:57 Test Engineer : FILSINGER Rotational Drop 60Deg C (140Deg F)

Impact Point : 32

Test Item : ATCOM6 Drop Height : 711.2mm (28in)

Sensitivity: Ch. 1: 15.00 g's/Div Ch. 2: 15.00 g's/Div Ch. 3: 15.00 g's/Div Ch. R: 15.00 g's/Div 1	MMMM	^~~ ^ ~~~
Filter:		
3	- M	~~~~
Trig. Ch.: ALL R Polarity: Window Level: 4.98 g's Mode: Single Event Pretrigger: 20 %	- Warner	m
CH TIME CUR AMI 1 77.31 mS -5.99 g 2 77.31 mS 1.48 g 3 77.31 mS 1.82 g R 77.31 mS 6.43 g	's 25.47 g's 61.34 In/s 's 8.00 g's 18.85 In/s 's 7.46 g's 19.65 In/s	TIME/DIV 12.8 mS 12.8 mS 12.8 mS 12.8 mS

Remarks:

CH	1	X-AXIS	(VERTICAL	MOTION)	
----	---	--------	-----------	---------	--

Y-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT) CH 2

CH 3 Z-AXIT (LONGITUDINAL MOTION)

CH 4 RESULTANT

GHI SYSTEMS, INC. CAT SYSTEM

Date : Thu May 02 96 15:11 Test Eng

Rotational Drop 60Deg C (140Deg F)

Test Item : ATCOM6

Test Engineer : FILSINGER

Drop Height : 711.2mm (28in)

12.8 mS

12.8 mS

12.8 mS

Impact Point : 35

Sensitivity: Ch. 1: 15.00 g's/Div Ch. 2: 15.00 g's/Div Ch. 3: 15.00 g's/Div Ch. R: 15.00 g's/Div 1 Filter: 2 3 Trig. Ch. : ALL R Polarity : Window Level: 4.98 g's Mode : Single Event Pretrigger: 20 % CH TIME CUR AMP PEAK AMP 1ST INT ZND INT TIME/DIU 1 77.31 mS -1.92 g's 15.73 g's 75.92 In/s 12.8 mS

Remarks:

2

3

CH I A-RAIS (VERTICAL MOTTO	CH	1	X-AXIS	(VERTICAL	MOTION
-----------------------------	----	---	--------	-----------	--------

CH 2 Y-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)

15.45 g's

-0.03 g's

0.64 g's

2.02 g's

77.31 mS

77.31 mS

77.31 mS

-4.35 g's -0.834 In/s -5.77 g's -17.82 In/s

77.99 In/s

CH 3 Z-AXIS (LONGITUDINAL MOTION)

CH 4 RESULTANT

GHI SYSTEMS, INC. CAT SYSTEM

Date : Fri May 03 96 08:39

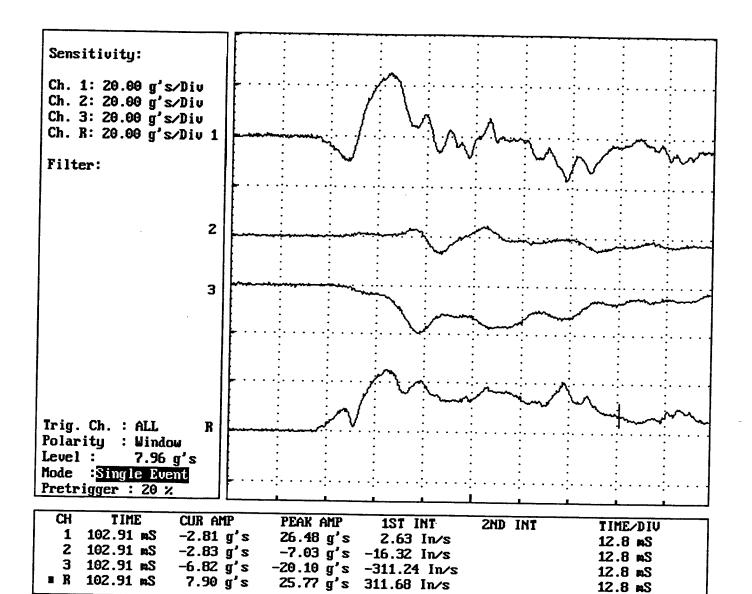
PENDULUM IMPACT 73.9DegC (165DegF)

TEST ITEM : ATCOM6

TEST ENGINEER : FILSINGER

IMPACT FACE : 4

IMPACT VELOCITY 2.13m/sec (7ft/sec)



Remarks:

CH 1 X-AXIS (VERTICAL MOTION)

CH 2 Y-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)

CH 3 Z-AXIS (LONGITUDINAL MOTION)

GHI SYSTEMS, INC. CAT SYSTEM

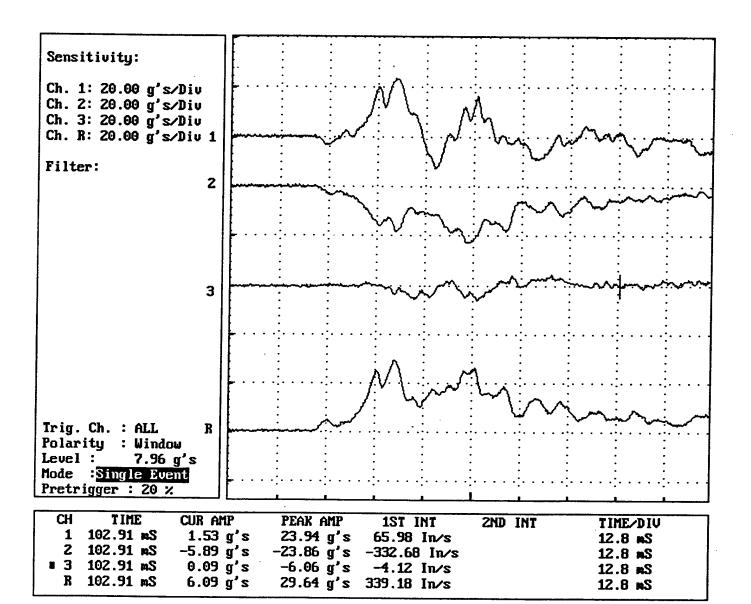
Date : Fri May 03 96 08:42

PENDULUM IMPACT 73.9DegC (165DegF)

TEST ITEM : ATCOM6 TEST ENGINEER : FILSINGER

IMPACT FACE

IMPACT VELOCITY 2.13m/sec (7ft/sec)



Remarks:

CH 1 X-AXIS (VERTICAL MOTION)

CH 2 (TRANSVERSE MOTION RELATIVE TO DESICANT PORT) Y-AXIS

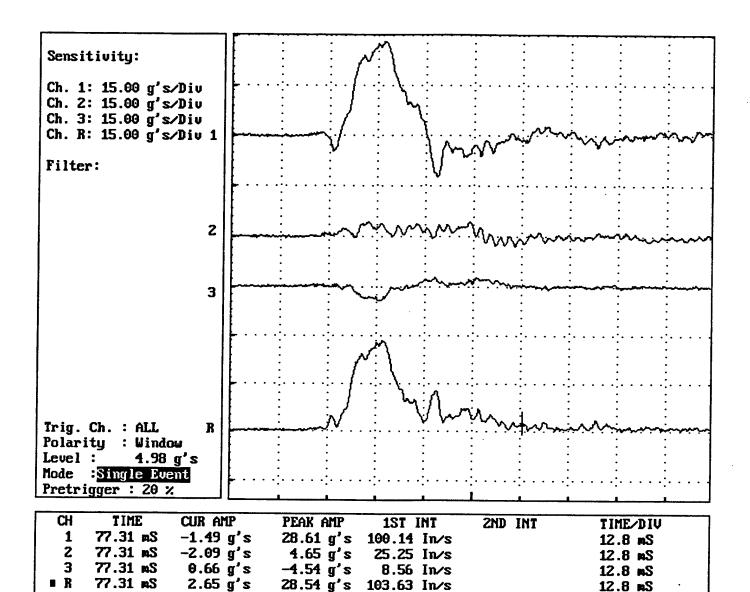
CH 3 **Z-AXIS** (LONGITUDINAL MOTION)

GHI SYSTEMS, INC. CAT SYSTEM

Date : Wed May 01 96 09:14 Test Engineer : Filsinger

Rotational Drop -28.9DegC (-20DegF) Impact Point : 326

Test Item : ATCOM6 Drop Height : 711.2mm (28in)



Remarks:

Ott T IN THIS I VENT TOTAL MOTION	CH	1	X-AXIS	(VERTICAL	MOTION
-----------------------------------	----	---	--------	-----------	--------

CH 2 Y-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)

CH 3 Z-AXIS (LONGITUDINAL MOTION)

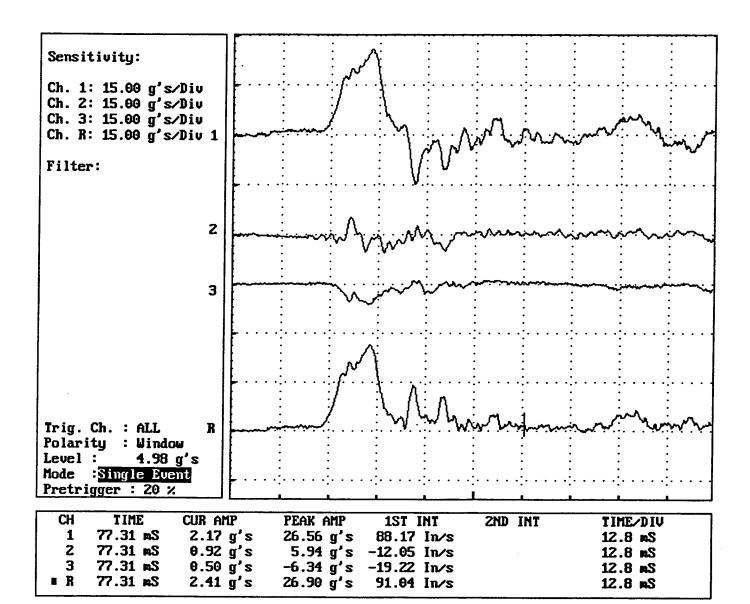
CH 4 RESULTANT

GHI SYSTEMS, INC. CAT SYSTEM

Date : Wed May 01 96 09:23 Test Engineer : Filsinger

Rotational Drop -28.9DegC (-20DegF) Impact Point : 345

Test Item : ATCOM6 Drop Height : 711.2mm (28in)



Remarks:

CH 1 X-AXIS (VERTICAL MOTION)

CH 2 Y-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)

CH 3 Z-AXIS (LONGITUDINAL MOTION)

GHI SYSTEMS, INC. CAT SYSTEM

Date : Wed May 01 96 09:32 Test Engineer : Filsinger

Rotational Drop -28.9DegC (-20DegF) Impact Point : 34

Test Item : ATCOM6 Drop Height : 711.2mm (28in)

Sensitivity: Ch. 1: 15.00 g's/Div Ch. 2: 15.00 g's/Div Ch. 3: 15.00 g's/Div Ch. R: 15.00 g's/Div 1 Filter:	Mymmy	marin
2		~~~~~~~
3	My My and	
Trig. Ch.: ALL R Polarity: Window Level: 4.98 g's Mode: Single Event Pretrigger: 20 %	WALLEY TO THE TOTAL TO THE TOTAL TOT	
CH TIME CUR AM 1 77.31 mS -6.22 2 77.31 mS -0.41 3 77.31 mS 1.28 R 77.31 mS 6.36	g's -24.71 g's -49.03 In/s g's 6.47 g's -18.24 In/s g's 4.76 g's 23.31 In/s	TIME/DIV 12.8 mS 12.8 mS 12.8 mS 12.8 mS

Remarks:

CH 1 X-AXIS (VERTICAL MOTION

CH 2 Y-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)

CH 3 Z-AXIS (LONGITUDINAL MOTION)

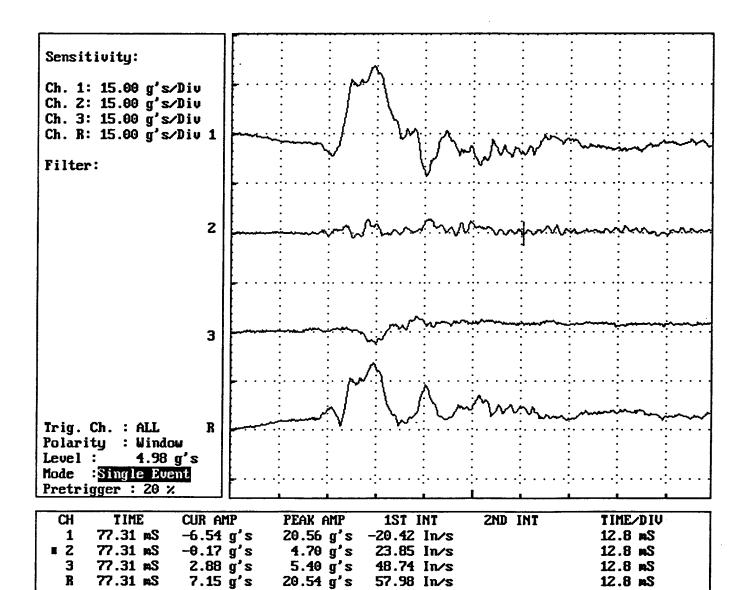
CH 4 RESULTANT

GHI SYSTEMS, INC. CAT SYSTEM

Date : Wed May 01 96 09:40 Test Engineer : Filsinger

Rotational Drop -28.9DegC (-20DegF) Impact Point : 36

Test Item : ATCOM6 Drop Height : 711.2mm (28in)



Remarks:

CH 1 X-AXIS (VERTICAL MOTIO	(ON)
-----------------------------	------

CH 2 Y-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)

CH 3 Z-AXIS (LONGITUDINAL MOTION)

GHI SYSTEMS, INC. CAT SYSTEM

Date : Tue Apr 30 96 11:19

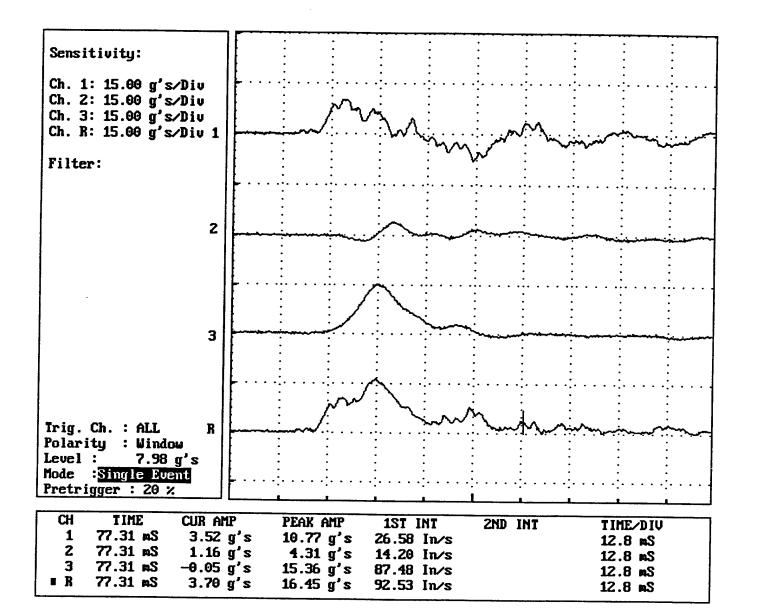
Pendulum Impact -53.9DegC (-65DegF)

Test Item : ATCOM6

Test Engineer : FILSINGER

Impact face : 2

Impact Velocity 2.13m/sec (7ft/sec)



Remarks:

CH 1 X-AXIS (VERTICAL MOT	(NOI
---------------------------	------

CH 2 Y-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)

CH 3 Z-AXIS (LONGITUDINAL MOTION)

GHI SYSTEMS, INC. CAT SYSTEM

Date : Tue Apr 30 96 11:24

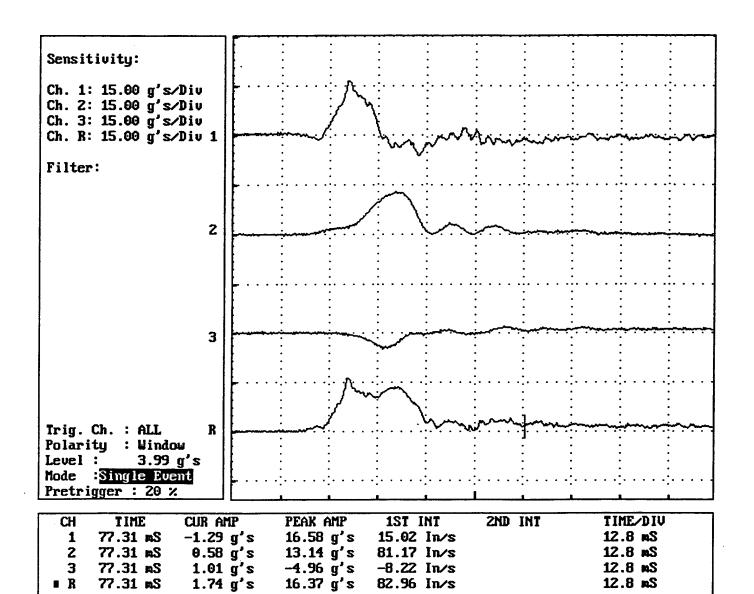
Pendulum Impact -53.9DegC (-65DegF)

Test Item : ATCOM6

Test Engineer : FILSINGER

Impact Face : 6

Impact Velocity 2.13m/sec (7ft/sec)

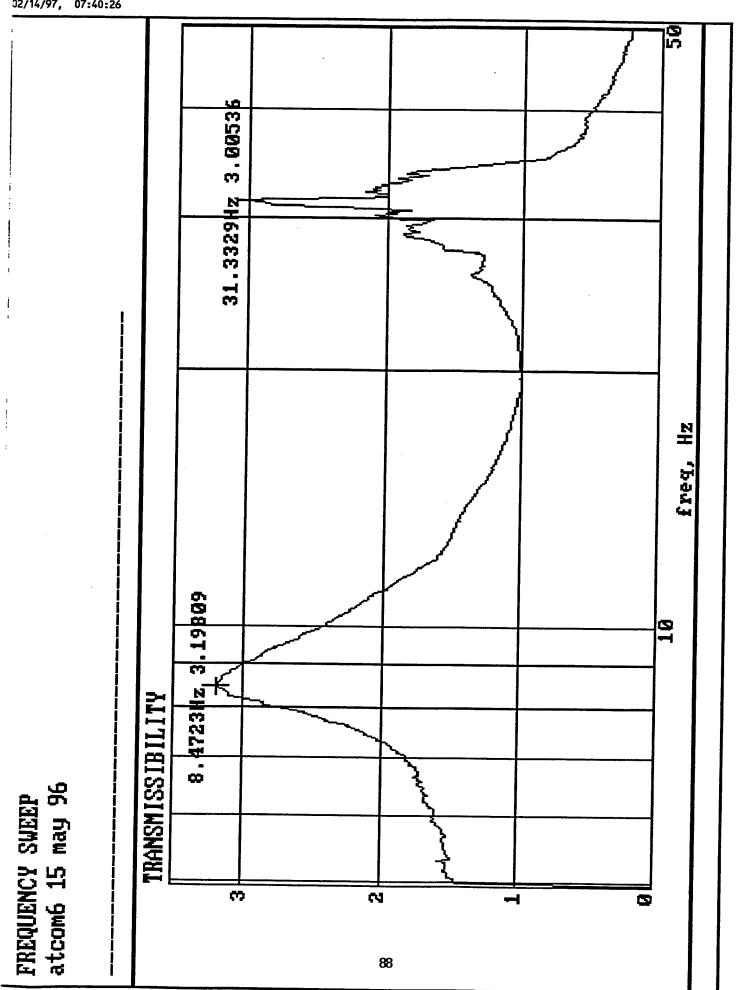


Remarks:

CH 1 X-AXIS (VERTICAL MOTION)

CH 2 Y-AXIS (TRANSVERSE MOTION RELATIVE TO DESICANT PORT)

CH 3 Z-AXIS (LONGITUDINAL MOTION)



APPENDIX 4 PHOTOGRAPHS

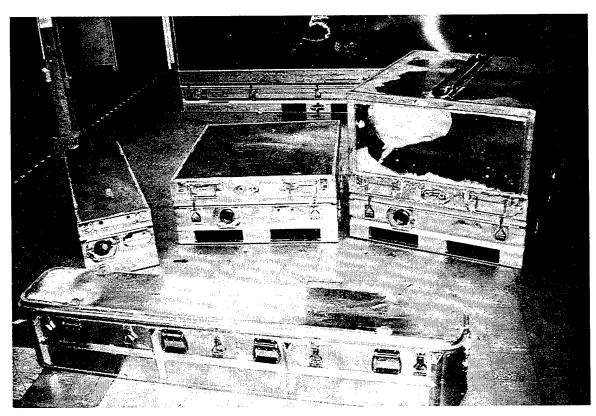


Figure 1. Containers #2, #3, #5 and #6.

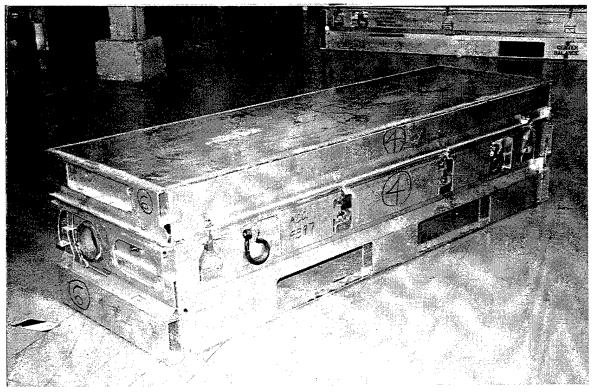


Figure 2. Container #2 with face designations shown.

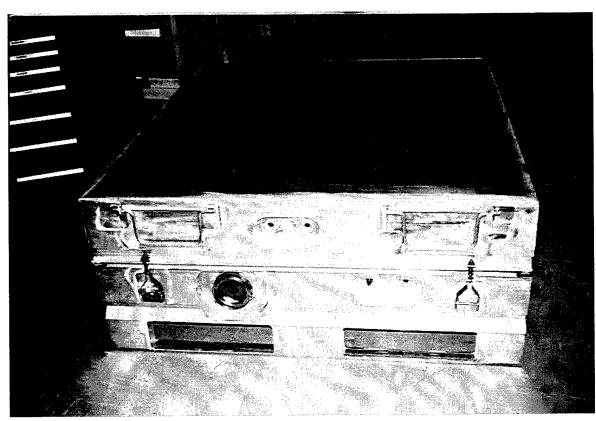


Figure 3. Container #5.

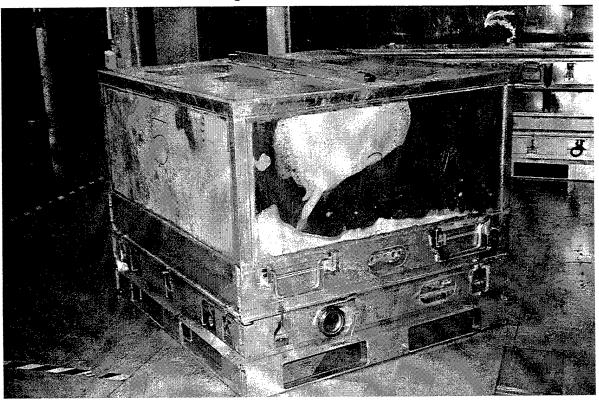


Figure 4. Container #6.

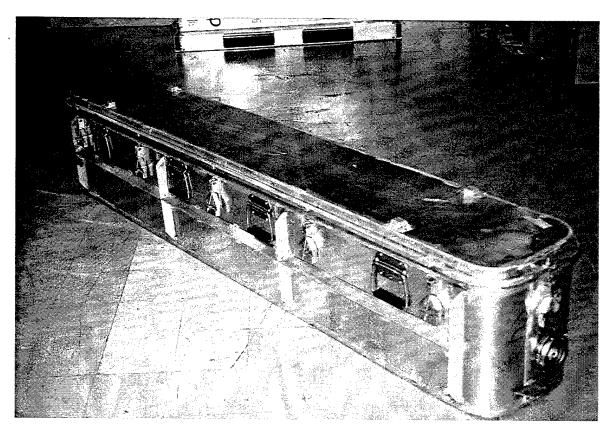


Figure 5. Container #3.

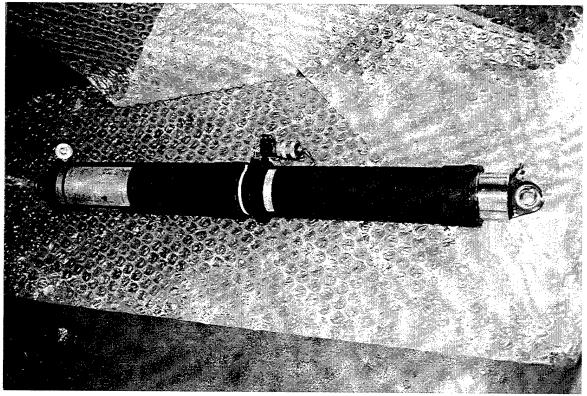


Figure 6. Fixed Landing Gear item for Container #2.

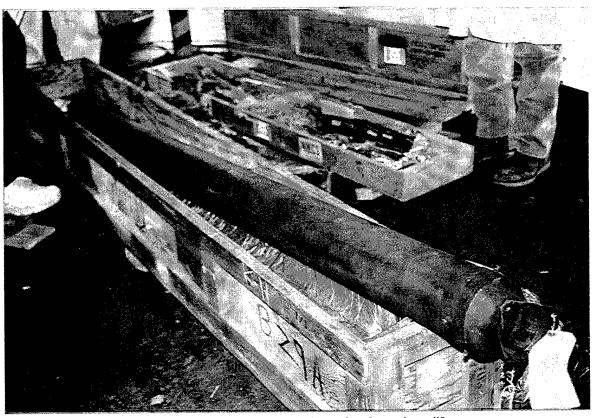


Figure 7. Shaft Assembly item for Container #3.

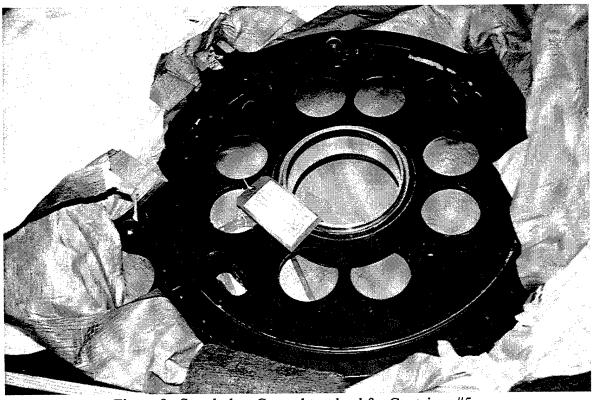


Figure 8. Swashplate Control test load for Container #5.

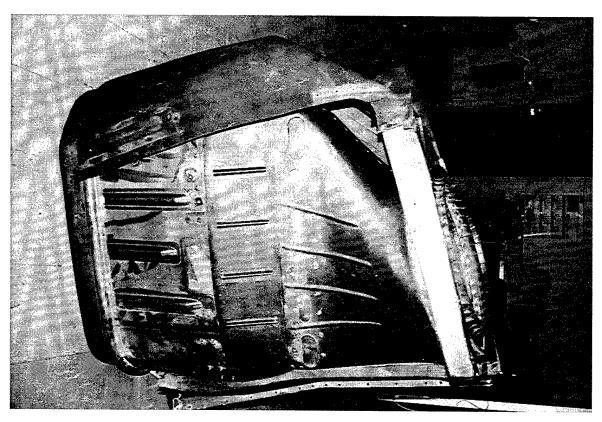


Figure 9. Support Structure test load for Container #6.

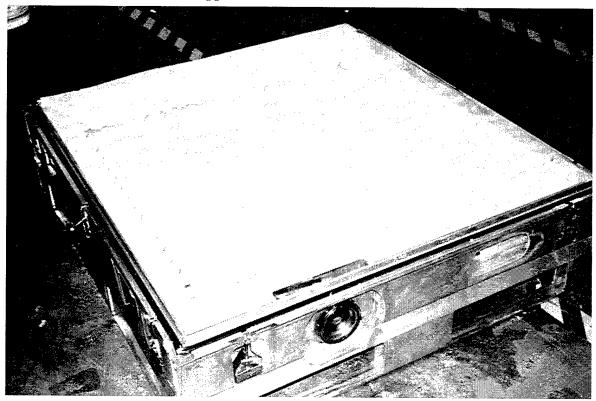


Figure 10. .Polyurethane foam cushioning.

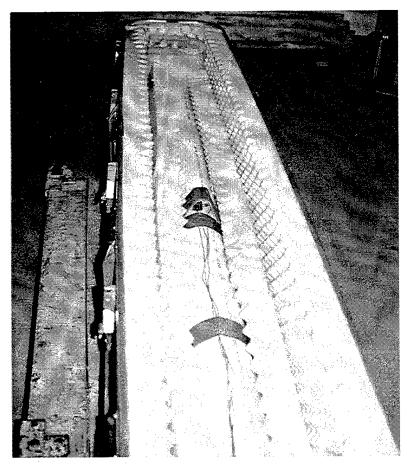


Figure 11. Container #3 with dummy load and accelerometer mounted.

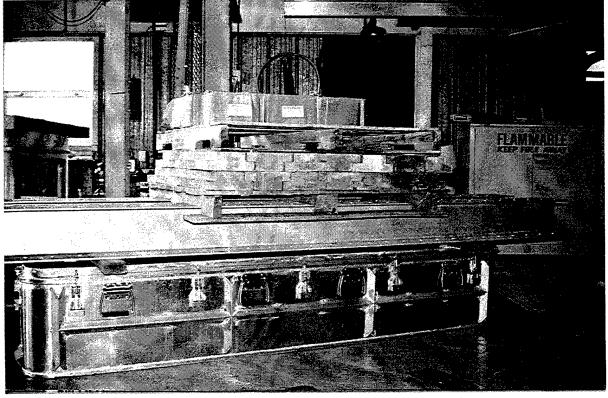


Figure 12. Superimposed Load test on Container #3.

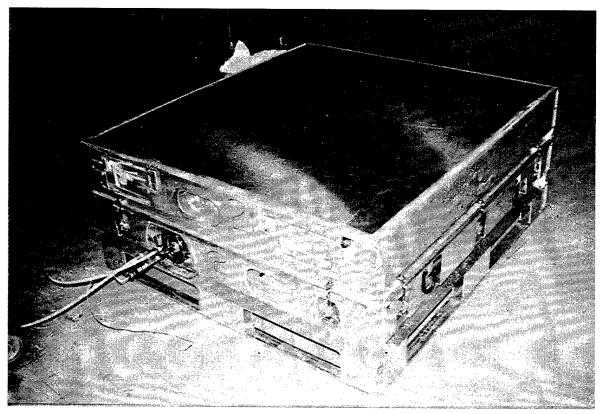


Figure 13. Pressurized Leak test on Container #5.

APPENDIX 5 STATEMENT OF WORK

Statement of Work

For

Aviation Spare Parts Family of Containers 10 July 1995

- 1. <u>Introduction</u>. The Air Force Packaging Technology and Engineering Facility will design a family of four (4) aluminum, reusable, long-life, multi-application containers for the storage and transportation of a pre-determined group of Aviation Spare Parts. These containers will protect the items during world-wide transportation and storage.
- 2. <u>Scope</u>. The Family of Containers will consist of four different containers. Three of the designs will require mechanical handling operations. The fourth will be a one or two person carry. The proposed internal/external sizes (in inches) of the containers are as follows:

Container #2	ID	54 X 11 X 6
	OD	63 X 20 X 17
Container #5	ID	39 X 30 X 9
	OD	48 X 48 X 20
Container #6	ID	42 X 42 X 29
	OD	50 X 50 X 40
Container #3-4	ID	85 X 9 X 9
	OD	94 X 20 X 16

- 3. Specification of Design. The Family of Aviation Spare Parts Containers will be designed in accordance with SAE ARP 1967, with the following modifications:
 - A. Par. 3.2.1 Cadmium plated parts shall not be used in the interior of the container.
 - B. Par. 3.2.2 N/A
 - C. Par. 3.3.1.1 N/A.
 - D. Par. 3.3.1.3 Vibration and shock isolation will be accomplished using complete foam encapsulation of the item.
 - E. Par. 3.3.1.4 N/A
 - F. Par. 3.3.2 Any container surface or cavity that may collect water will be either convex to allow run-off or have drainage holes in accordance with the provided drawing package.
 - G. Par. 3.3.3.2.1 Wide handle, cam-over-center latches requiring no use of tools to open or close and meeting arctic glove requirements shall be used.
 - H. Par. 3.3.3.2.2 Container will be designed and testing for a 1.0/1.0 PSIG pressure vacuum.
 - I. Par. 3.3.4.2 Tiedown provisions will be provided, no special towing provisions will be incorporated.
 - J. Par. 3.3.5.1 A desiccant port with cover shall be provided as well as a confined space using foam or aluminum for desiccant storage, a desiccant receptacle will not be used. K. Par. 3.3.5.6 N/A

- L. Par. 3.3.5.8 N/A
- M. Par. 3.3.5.9 N/A
- N. Par. 3.4.3 Interrupted or tack welds will be used when a continuous seal weld is not required. No caulking will be used on these types of welds.
- O. Par. 3.7 Finish, for production containers only not prototype containers.
 - a. Cleaning and surface treatment in accordance with MIL-T-704.
 - b. Priming, one coat, in accordance with TT-P-1757.
 - c. Painting, two coats, conforming to TT-E-515, TT-E-516 or TT-E-485 using color olive drab, No. 34087 or FED-STD-595.
- P. Par. 3.9, Section c N/A
- Q. Par. 3.9, Section j N/A
- R. Par. 3.9, Section m N/A
- S. Par. 3.9, Section n N/A
- T. Par. 3.10 One name plate on cover with the following information:

"Container, Shipping & Storage, Repairable Aviation Part"

NSN

Bar Code

Part Number

Serial Number (If required)

Contract Number

Manufacturer

Tare Weight, Dimensions, and Cube

Design Activity

"Property of the US Air Army"

- U. Par. 3.10.1 N/A
- V. Par. 3.11 N/A
- W. Par. 4. N/A
- X. Par. 4.3 Instrumentation for shock readings will be placed on top of the dummy load at the intersection of the X and Y axes of the Center of Gravity (CG) and not the true CG.
- Y. Par. 4.5.2.1 and 4.5.2.2 Container will be designed and tested at 1.0/1.0 PSIG.
- Z. Par. 4.5.3 Rotational or Free Fall drop tests will be performed according to container size and weight.

AA. Par. 4.5.4 N/A

APPENDIX 6 DISTRIBUTION LIST

DISTRIBUTION LIST

CAMERON STATION ALEXANDRIA VA 22304-6145	T
HQ AFMC/LG 4375 CHIDLAW ROAD SUITE 6 WRIGHT-PATTERSON AFB OH 45433-5006	1
HQ AFMC/LGT 4375 CHIDLAW ROAD SUITE 6 WRIGHT-PATTERSON AFB OH 45433-5006	1
AFMC LSO/LO 4375 CHIDLAW ROAD SUITE 6 WRIGHT-PATTERSON AFB OH 45433-5006	1
AFMC LSO/LOP (LIBRARY) 5215 THURLOW ST WRIGHT-PATTERSON AFB OH 45433-5540	3
HQ USAF/INT 1030 AIR FORCE PENTAGON RM 4B322 WASHINGTON DC 20330-1030	1
72 ABW/LGTP 7516 SENTRY BLVD SUITE 201 TINKER AFB OK 73145-8912	1
75 ABW/LGTP 7520 WARDLEIGH RD HILL AFB UT 84056-5733	1
76 ABW/LGTP 410 NORTH LUCK RD SUITE 289 KELLY AFB TX 78241-5312	1
77 ABW/LGTP 1961 IDZOREK ST BLDG. 7830 MCCLELLAN AFB CA 95652-1620	1

78 ABW/LGTP	1
455 BYRON ST	
BLDG 376 SUITE 1150 ROBINS AFB GA 31098-1860	
KOBINS AFB GA 31098-1860	
COMMANDER	-
NAVAL INVENTORY CONTROL POINT	1
ATTN: E. H. BRIGGS (CODE 0512)	
700 ROBBINS AVENUE	
PHILADELPHIA PA 19111-5098	
3000	
COMMANDER	1
NAVAL INVENTORY CONTROL POINT	Τ.
ATTN: F SECHRIST (CODE 054X)	
5450 CARLISLE PIKE	
MECHANICSBURG PA 17055-0788	
DLSIE/AMXMC-D	1
US ARMY LOGISTICS MGT COLLEGE	
FT LEE VA 23801-5000	
US ARMY ARDEC/SMCAR-AEP	-
ATTN: Mike Ivankoe	1
DOVER NJ 07801-5001	
DEFENSE LOGISTICS AGENCY	1
ATTN: MMDOO MR. JOE MALONEY	_
8725 JOHN KINGMAN RD	
SUITE 2533	
FORT BELVOIR VA 22060-6221	
AMARC/LGT	
6805 E. IRVINGTON RD	1
DAVIS MONTHAN AFB AZ 85707-4341	
HQ PACAF/LGTR	1
25 E. STREET	
BLDG 1102 STE 1326	
HICKAM AFB HI 96853-5426	

HQ USAFE/LGT UNIT 3050 BOX 105 APO AE 09094-0105	1
HQ ACC/LGTT 130 DOUGLAS ST STE 210 LANGLEY AFB VA 23665-2791	1
HQ AF SPACECOM/LGT 150 VANDENBURG ST. STE 1105 PETERSON AFB CO 80914-4540	1
HQ AETC/LGT 1850 FIRST ST WEST BLDG 903 RANDOLPH AFB TX 78150-4308	1
HQ AFSA/SEW ATTN: ARLIE ADAMS 9700 AVENUE G STE 263 KIRTLAND AFB NM 87117-5670	1
US TRANSCOM/JTCC ATTN: S. OWENBY 203 W LOSEY SCOTT AFB IL 62225-5219	1
DEAN SCHOOL OF MILITARY PACKAGING TECHNOLOGY ATSZ-MP BLDG 360 ATTN: LARRY FRANKS	1
ABERDEEN PROVING GROUND MD 21005-5001	
COMMANDANT HQ USMC ATTN: MIKE DAWSON (CODE LPP-2) 2 NAVY ANNEX WASHINGTON DC 20380-1775	1

HQ AMC/DOJ 402 SCOTT DR BLDG 1600 ROOM 132 SCOTT AFB IL 62225-5363	1
HQ AFRES/LGT 155 SECOND ST ROBINS AFB GA 31098-1635	1
ANGRC/LGT 3500 FETCHET AVE ANDREWS AFB MD 20331-5157	1
ODUSD/L/MRM PENTAGON 2D261 WASHINGTON DC 20301-8000	1
COMMANDER, US ARMY AVIATION AND TROOP COMMAND AMSAT-I-SDP 4300 GOODFELLOW BLVD ATTN: STEVE GEASCHEL ST. LOUIS MO 63120-1798	5
COMMANDER, US ARMY MISSILE COMMAND AMSMI-MMC-MM-LS-MDP ATTN: JOHN WHEELER REDSTONE ARSENAL AL 35898-5239	1
US ARMY MISSILE COMMAND AMSMI-RD-ST-GD ATTN: DR JOHN PRATER REDSTONE ARSENAL AL 35898-5247	1
CHIEF, LOGSA PSCC ATTN: AMXLS-TP-P 11 HAP ARNOLD BLVD TOBYHANNA PA 18466-5097	1

US ARMY ARDEC	1
AMSTA-AR-AEP Pkg Div BLDG. 455	
ATTN: EUGENE FARRELL	
PICATINNY ARSENAL, NJ 07806-5000	
COMMANDING OFFICER	-
NAVAL WEAPONS STATION EARLE	1
201 HIGHWAY ROUTE 34 SOUTH (CODE 5022)	
ATTN: JAMES RAEVIS	
COLTS NECK, NJ 07722~5023	
COLIS NECK, NO 07722-3023	
86 MS/LGVM	1
BLDG 2470	
RAMSTEIN AB GERMANY	
ATTN: KEVIN HERRING	
HQ AMC/LGAA	
402 SCOTT DRIVE UNIT 2A2	
ATTN: CHIEF EARLE E. GILLESPIE	
SCOTT AFB 62225-5303	1
	_
US ARMY ARDEC	1
AMCPM-AL Bldg 455	
ATTN: Al Galonski	
Picatinny Arsenal NJ 07806-5000	
Commanding Officer	1
Naval Weapons Station Earle	_
Route 34 South Code 5022	
ATTN: Mark Shelley	
Colts Neck NJ 07722-5023	
COMMANDING OFFICER	-
NAVAL SURFACE WARFARE CENTER	1
300 HIGHWAY 361 CODE 4074	
ATTN: MR. FRANK NIEHAUS	
CRANE IN 47522-5000	

COMMANDER, U.S. ARMY	1
TANK AUTOMOTIVE AND ARMAMENTS COMMAND	
AMSTA-TR-E/MATL	
ATTN: MR. MIKE BROWN	
WARREN MI 48397-5000	
ASC/VXYC	1
102 D AVENUE, SUITE 168	
ATTN: MR BILL YOURICK	
EGLIN AFB FL 32542-6807	
DIRECTOR, U.S. ARMY EDGEWOOD RESEARCH	1
DEVELOPMENT AND ENGINEERING CENTER	_
SCBRD-ENE-S	
ATTN: MR. DEAN HANSEN	
ABERDEEN PROVING GROUNDS MD 21010-5423	
ASC/ALXF	1
ATTN: DORIS HEIDENREICH	
2475 K STREET, SUITE 1	
WRIGHT-PATTERSON AFR OH 45433-7642	

APPENDIX 7 REPORT DOCUMENTATION